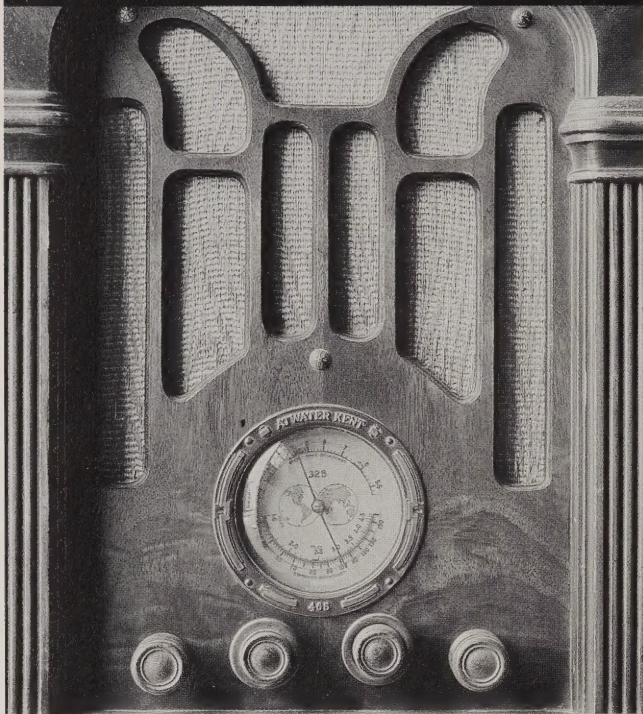




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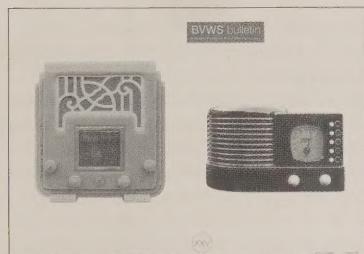
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Separations and Printing by Apollo

Honorary Members:

Gordon Bussey I Dr A.R. Constable
Ray Herbert I Jonathan Hill
David Read I Gerald Wells



Front cover: Zenith 5R 312 'Beehive' set.

Rear cover: AWA Radiolette in jade green urea formaldehyde cabinet.

Front and rear cover photography by Carl Glover
Graphic design by Carl Glover and Christine Bone

Edited by Carl Glover.
405 Alive edited by Andy Henderson

Proof-reading by Mike Barker, Ian Higginbottom, Andy Henderson and Peter Merriman **

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From the chair

The leaves are now almost completely off the trees in my garden, and the Christmas season is once again upon us. With it comes the new, larger format Bulletin. The first to incorporate 405 Alive!

As you read the Bulletin you will see that articles of both Wireless and TV are arranged to provide a varied cornucopia of material with some excellent and rare pictures. I hope everyone will enjoy the new combination, as this is how the Bulletin will look from now.

Just a quick reminder. If you are reading this then you MUST have received your membership renewal form! Please check it and add anything that is needed in way of updates, then hurry it back to Steve Pendlebury as soon as possible. Last year was so much better as the vast majority of renewals were received before mid January and this makes life so much better for us. So if it's not to hand, go and rescue it from the bin now.

It is now accepted that the Christmas Bulletin will come complete with a CD-ROM. This year is no exception. The CD is the result of many hundreds of hours hard work over a hot scanner by Terry Martini. The CD is a compilation of the BVWS Bulletins from Vol. 1 to Vol. 20. Almost all of these are no longer available as back numbers and most never were, yet they hold a vast library of information about the receivers, design, manufacturers and restoration tips, many of which

are probably long forgotten and could save much time and effort. So my Thanks go to Terry for the scanning, Paul Stenning who once again designed and built a front end indexing system for the CD and Ian Higginbottom for the supply of original Bulletins.

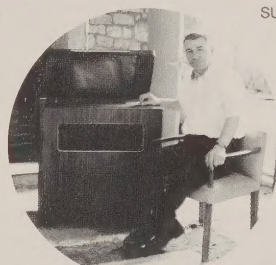
For next year, we will be running a competition for the 'Duncan Neale award for excellence in Preservation' This will be open to any member, and take the form of either restoration or preservation of an article. The important aspect of the competition will not be the item itself so much as the condition prior and post preservation or restoration.

(There is a difference!), full documentary evidence will be needed to show what work has been carried out and how it was completed. So the Christmas holiday will give you time to think about this and maybe decide if you have anything that you wish to enter. The Competition will be held at the June 2002 Harpenden meeting.

I would like to take this opportunity to wish you all a very happy Christmas and a prosperous and exciting New Year.

Merry Christmas.

Mike.



Would you like a round Ekco for free?

So would I! But now that I have your attention, please may I draw your attention to the renewal slip that came with this Bulletin? The address panel on it was used in conjunction with the window envelope to deliver this bulletin - so if you can't find it, look around the bin or wherever you or your spouse disposed of the envelope!

Before you read on and enjoy the delights of your Bulletin, why not renew now? Or at least, put the renewal slip somewhere safe for when you come to renew after the festive season? Please don't lose this slip as it makes my job of processing over 1000 renewals at once all the more difficult!

Finally, may I take this opportunity to wish all members a peaceful Christmas and a prosperous 2002.

You never know, it may bring you a free round Ekco!!!

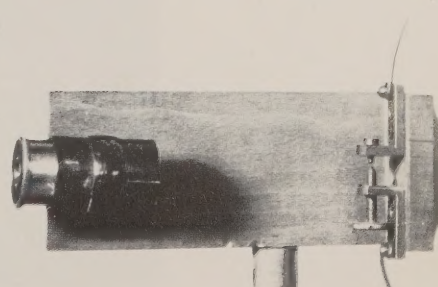
Steve Pendlebury
Membership Secretary

Newcomen Society Lecture by Dr. Anthony Constable

Marconi's Transatlantic Wireless Message, 1901: The Emergence of a New Technology.

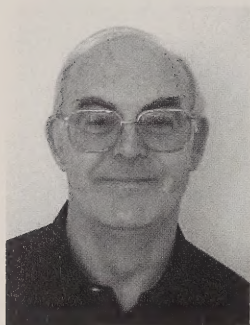
Time & Date: 5.45 p.m. on 12 December 2001
Venue: Royal Entomological Society
41, Queens Gate, London, SW7

This lecture will review the equipment developments which took place from 1888 to Marconi's successful transatlantic message on 12th December 1901.



Restoring a Philco 444 People's Set

By Colin Boggis, Radio Renaissance



Some months ago I spotted the empty Bakelite case of a Philco People's set sitting on a shelf in a local traders. Enquiries were made and it seemed that this particular radio was in the process of being restored for the shop owner to keep. Since this particular shop had a number of other radios (but not any I wanted at the time), I left my telephone number and forgot all about the Philco.

Without Gerry Wells, where would we be? He really deserves a Knighthood!

A couple of months later I was asked if I still wanted the set – it seems the restoration had faltered, and the set was now available for sale. So I said “yes” and went along to buy it. Apart from the case, which was in very good condition, I was confronted by a cardboard box full of parts including, horror of horrors, a chromium-plated chassis and speaker frame! The set was basically complete, except for the dial pointer and Aerial / Earth panel which were missing. Despite the chrome, the price was reasonable, and so I made the purchase.

The first thing I needed was service data and, having printed off the Trader sheets from the BVWS CD-Rom, I soon realised that I did not have a good drawing of the under chassis layout from which to rebuild the set. I also noted that the loudspeaker was a write-off due to the way in which it had been dismantled for re-plating. The cone was torn badly and the voice coil deformed beyond repair.

So a phone call to Gerry Wells was made from which I ascertained that 1: he had the original Philco Service Sheets, 2: he could supply a dial pointer and 3: he might have a speaker in his stores. Gerry suggested I pay him a visit when I was ready, to find and collect the parts I needed. He put a copy of the service data in the post to me.

Without Gerry, where would we be? He really deserves a Knighthood!

Over the next few weeks, in between other restoration jobs (an Ekco AD75, a Sonora from France and a Bush DAC90A), I cleaned and refitted the valve holders, rebuilt the pitch-filled capacitor blocks and tested all the other components. I was pleased to find that the tuning gang had been sand-blasted clean and only needed lubricating, whilst the power transformer (also chrome-plated) had been re-assembled and checked out OK for insulation and DC resistance. Alas the speaker field coil measured some 10,000 ohms instead of 2,000 and many of the carbon resistors were more than 50% high. The main smoothing can was cut open at the point where it would be hidden by the mounting clip, cleaned out, and 2 new 10 microfarad electrolytics inserted. A negative terminal was added since, in the original, the case was used for this purpose, and it was felt a proper soldered connection would be more reliable. The can was put back together using an internal plastic sleeve and “Araldite” resin adhesive. The output transformer checked out OK, so it was cleaned and the clamp repainted. The tuning coils and IF coils all had faults



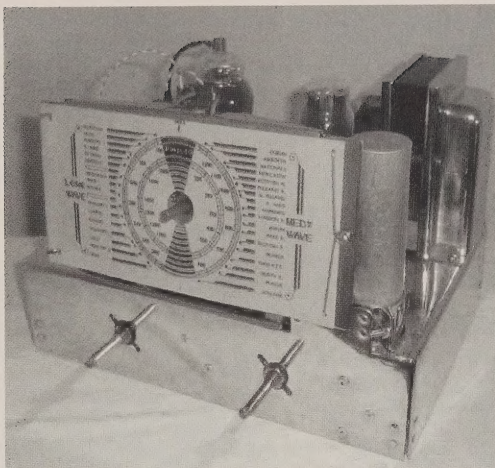
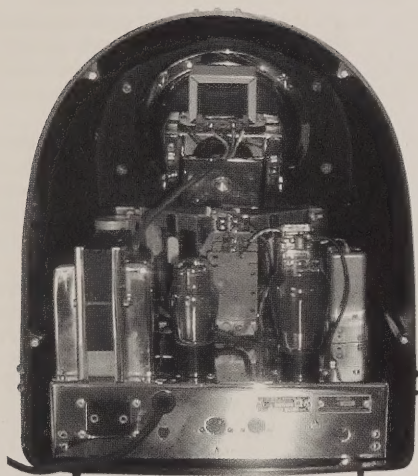
where the windings joined the connection tags – these were all repaired, sometimes at the expense of a turn or two, and resealed using ordinary candle wax. The wavechange switch cleaned up perfectly, but the volume control was open circuit at both ends of the track. Being unable to locate another 330K control, I settled for a 1 Meg. Potentiometer with a parallel 470K fixed resistor across the outer connections. This was hidden inside the control case.

I purchased some 34 swg enamelled copper wire, made a new bobbin, and rewound the speaker field coil. This was somewhat laborious and quite tricky and was accomplished using an electric drill with speed control and a gloved hand to provide tension and direct the winding wire onto the bobbin. I was aiming for a 2000 ohm DC resistance and was surprised to find that the full bobbin (the original was full) was too high at nearly 2600 ohms, so I had to remove quite a lot of turns until it was correct. The windings were dipped in varnish, and once dry sealed off with black gaffer tape.

The original baffle board was missing, so a new one was cut from plywood and painted matt black. A piece of suitable grille cloth (originally supplied by BVWS member Sidney of Traditional Radio Grilles) was glued in place, and the assembly put aside for later.

By now I had compiled a list of the parts I needed, and so I called Gerry again to arrange my visit. This finally took place on what seemed to be the hottest day of the year so that I arrived at The Radio Museum, gasping for refreshment and sweating profusely. Despite this, Gerry was pleased to see me, and we spent a couple of hours seeking out the parts I required. Once again Gerry proved himself, supplying me everything I wanted apart from the loudspeaker, although he could have provided a similar one from the same period. In the event, since I'd rewound the field coil, I thought I'd try to fit a new cone to the original, if only to gain experience in this (black?) art. It was at this point that Gerry told me the original field coil was probably OK, the high resistance being the result of a poor soldered connection on the inside end of the coil. He said it would have re-soldered itself in use! So the day spent re-winding was a real waste, apart from the fact I now know quite large coils can be wound without any special equipment – just care and patience.

Using the excellent Philco service data, the chassis was rewired using rubber covered wire stripped from cotton covered mains flexible cable and also tinned



copper wire with acrylic glass coated sleeving, which looks identical to "Systoflex".

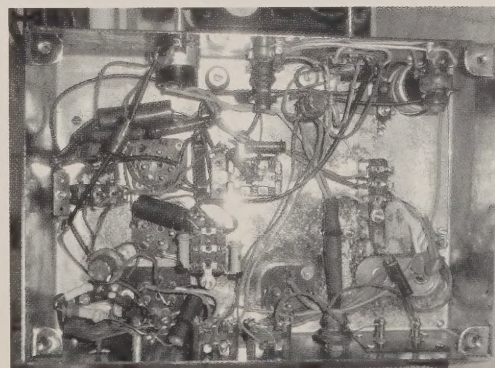
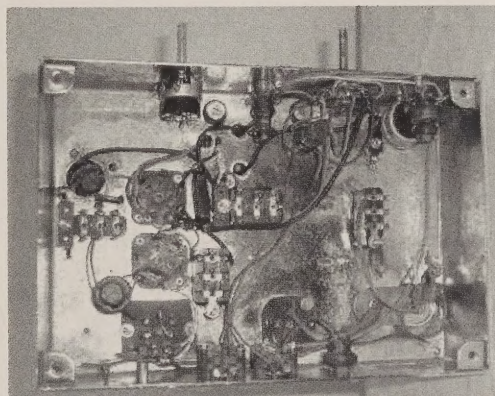
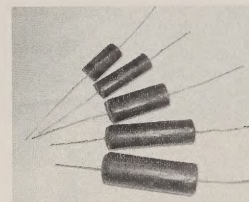
The resistors provided by Gerry were fitted, and those capacitors not in the blocks rebuilt using modern polystyrene and polypropylene components inserted into the original cardboard tubes. The mica capacitors all tested OK and were retained.

Once wiring was completed, after a careful check of the work so far, I decided to test the radio without its original loudspeaker, since I was still puzzling over how I was going to fit a new cone. I wired up the output transformer to a spare moving coil speaker and connected my rewound field coil (mounted onto the pole piece and keeper) so as to provide the LF choke. In went the valves, volume control to maximum, and on went the mains supply via my trusty "Variac". I wound up the power to around 120 volts and took a few measurements. I had 3 volts across the heaters and dial bulb and about 150 volts on each of the rectifier anodes. The DC output was very low, but given that the valve heaters were not hot enough for proper emission, this was no surprise. I wound the volts up to maximum and both watched and listened very carefully. The pilot lamp glowed nicely as did the valve heaters, and a faint hum came from the speaker. Nothing appeared to be overheating. Further DC voltage checks indicated all was well, and a touch of my finger on the output valve top cap produced a healthy hum. A quick twiddle of the dial produced faint signals, and there was a healthy crackle when changing waveband.

Time to get out the signal generator and commence alignment. Following the procedure in the Philco data, I was soon listening to a healthy signal as first the IF's, then MW and finally LW were set up. No problems were encountered at all during the alignment, and the whole procedure took less than half an hour. Even before I connected an aerial, the radio was pulling in many stations with excellent selectivity and sensitivity. The volume was more than sufficient and the tone excellent.

So what about the original speaker? The cone and voice-coil were beyond repair, whilst the frame and new field coil were in perfect condition. First I searched the net for a cone supplier in the UK, without success. I placed emails on the Yahoo wireless Group site and I contacted several people that renovate radios, again without success.

In the end I simply purchased a speaker with the same outer frame diameter and fixing centres as the



original. Throwing caution to the wind, the cone was then detached from the frame by firstly bending the lip out of the way, and cutting between the cone and frame with a craft knife. Next the corrugated fabric suspension & dust cover was cut away and the "pig tails" cut off the connection tags allowing the cone to be lifted off. Offering the new cone up to the old frame and magnet showed 3 problems: 1. Whilst the voice-coil passed over the centre pole piece, it was too tight in the keeper plate hole; 2. The cone was considerably deeper than the original and 3. The voice coil measured 6 ohms DC against the original 2 ohms.

The hole in the keeper plate was milled out at a local precision engineering shop. Some turns were carefully taken off the voice coil to reduce the resistance, and a hardwood spacer made up so that the voice-coil sat correctly in the magnetic field when the cone outer edge was also correctly seated.

The assembly was then tested with the cone not fixed, and amazingly it worked OK provided the cone was held centred in the frame. However, at high volume the voice-

coil was heard to "bottom" giving rise to distortion. An additional 1mm spacer resolved this problem and the cone was then glued into the frame using slow-set epoxy adhesive, which allowed time to carefully centre the voice-coil using a number of thin slivers of plastic sheeting inserted between the coil former and pole piece.

Once set, the speaker was tested again and worked OK. The only problem noted is that it produces less volume than the speaker first used to test the radio – my assumption is that the cone being made of a heavier paper is simply less efficient. To complete the appearance and make up for the missing corrugated suspension, a "spider" was cut out from plastic faced card and fitted in the centre of the cone, taking care not to push it off centre. Then the speaker was enclosed by a black muslin bag to keep out the dust, and fitted to the already prepared baffle and into the cabinet.

My "444" now resides in my dining room and was well worth the time taken to restore it; about 3 months in total. Would I rebuild another speaker? Yes, I would, but first I would try much harder to find a complete replacement!

Mechanical Television-was it really like this?

To my right was another micro-
phone, this one
standing in front
of a pane of glass.
I could see another
room and two
people, probably
engineers, busying
themselves with
what looked like a
dark-gray camera.
The camera had
a four- or five-inch
snout on it, with
a light mounted
overhead. It didn't
look like any
other camera
I'd ever seen.

Dicky Howett writes: The quotation below is from an autobiographical book by US broadcaster Guy LeBow ('Are We On The Air?') and it recalls an unspecified time pre-war when, as a 12 year old, he was invited to sing a song in front of an experimental CBS spotlight system. LeBow says;

"I walked into a corridor about fifteen feet long-and there were two empty wooden benches against the wall. The man from CBS kept pushing me straight ahead to another door. It opened into a strange room about the size of eight telephone booths, if you glued them together. It had a low black ceiling and all-black walls. In the middle stood a little piano like I'd seen in nightclubs in the movies, with a boom mike hanging overhead and a cheery guy plunking the keys.

To my right was another microphone, this one standing in front of a pane of glass. I could see another room and two people, probably engineers, busying themselves with what looked like a dark-gray camera. The camera had a four- or five-inch snout on it, with a light mounted overhead. It didn't look like any other camera I'd ever seen. Then one of the two men came out and took my music, which he gave to the piano player. I'd brought "Auf Wiedersehen," my good-luck song. The pianist warmed up and so did I. And I wondered, "What the heck comes next?" What came next was another man putting white clay on my face, just leaving my mouth and eyes uncovered. "What's this?" I said. "We didn't have to wear anything on radio." "Makeup. You have to wear makeup for television," he explained. "We have to take out all the lines on your face." "Lines?" I'm twelve years old!

He patted and stroked and smoothed the stuff on my face. "If we didn't put this on, you might wind up looking like a zebra. These lights make people's faces-even kids' faces-look strange unless we cover you up." Oh, sure, I thought to myself. I don't want to look like a zebra. Better to look like a Zombie. So here I am in front of the standing microphone in front of the glass, the pianist is ready-and suddenly the place goes pitch black.

Everything-the dim bulbs in this little room, the lights in the room on the other side of the window. I thought we had a power failure. But a half-second later the brightest light I've ever seen points at me from the top of the camera. I blinked. "Don't blink, sonny," a voice said. "O.K., take five beats, kid, and sing." How could anyone sing facing this contraption? The more I looked into the light, the more strange I felt. Like I was disappearing into a huge white hole. Then my eyes adjusted and I didn't even think about it as I gave CBS my best warble.

When I finished, the light went out and everything stayed dark. I heard someone walk over to me and I heard the CBS man's voice. "O.K., kid, you can come with me." He led me somewhere and sat me on a wooden bench. This must be the corridor, I thought. But the lights were out here too. "Hey" I said. "When do they turn on the lights again?" "They are on," the CBS man told me. I panicked. "I'm blind. Help." I was sure that the light in the studio had blinded me. "Help, I'm blind. Somebody help me." "No-no-no, don't worry kid," said the CBS man. "You just have eye bends. Everybody gets them. In about two or three minutes you'll be able to see fine. You'll be able to see everything." He was right. It took about three minutes, my vision cleared up and then the CBS man told me that even the big stars went through the same thing when they stood in front of that light.

Dicky Howett adds: Guy LeBow seems here to be describing a spotlight tv system, which if anything is added proof that mechanical systems were only en-route to a fully practical method of image capture. Also, it appears that LeBow's memory inverts the procedure. Surely, the low definition would have required the addition of facial lines, not the obliteration, as described here, with 'white clay'. Other experiments show performers with dark make-up emphasising the nose and eyes. Of course, that would have ruined the '12 year old kid' joke. Selective and misleading memories are the bane of the television historian.



Fig 1



Fig 2

Valve Testers by Denis Tabor

I well remember the first time I saw a valve tester. It was summer 1942. The war had meant that many domestic wireless repairmen had been called up and our local wireless shop had lost two men, leaving only the proprietor. I had known him for some years through taking in my accumulator for charging and the occasional buying of second-hand battery valves. He asked me whether I would help out in the school holidays for ten shillings (50p) a day. For a fifteen year old, this was undreamt of wealth so I accepted with alacrity.

Most of the faulty sets had a defective valve, or simple faults such as an O/C output transformer or resistor. These I could fix quickly but, if there was anything more challenging, the proprietor took over and explained what he was doing. This taught me a lot and I really enjoyed the experience.

He taught me how to use the valve tester, an Avo two-part instrument. He had bought it in early 1937 when it first came out. It then had two valve panels, one with British and Continental bases and the other with American valve bases. Avo quickly realised that with valve manufacturers producing an ever-increasing variety of valve types, the two panel system could not cope with the differing valve pin connections so, just over a year later in September 1938, they introduced a new panel with the familiar roller switch. They made this available at a modest price to existing owners and this is the one I learnt to use.

It was sometimes tempting, when confronted with a fault that could well be due to a faulty valve, to test two or three from the set just to see, but I was quickly taught to fault find from first principles, using the testmeter. I was also taught not to place total trust in the valve

tester. Where the tester was particularly useful though, was to demonstrate to a customer the state of his valve, although a disreputable repairman could also 'prove' that a perfectly good valve needed replacing.

Thus, my first keen interest in valve testers. There was then a gap in my practical involvement with them as studies intervened. Then, just before the end of the war, I joined the RAF as a radar fitter but, despite a variety of postings, including maintenance units, instructor at Yatesbury, ground radar and air radar with Bomber Command and Coastal Command, I never came across a valve tester, although the RAF Valve Tester Mark IV is not uncommon. Perhaps this was used in Wireless Sections, which were always separate from Radar Sections.

One reason for their not being used could be that in radar equipment, especially in aircraft, although very large numbers of valves were used, they were of relatively few types, particularly the VR91 (EF50) and VR65 (SP61). Vast stocks of spare valves were carried and, when servicing complex equipment, it was always tempting to substitute a valve before getting down to proper detailed fault finding. Thus, there was no need for valve testers.

After leaving the RAF in 1952, there was a long gap in

It was sometimes tempting, when confronted with a fault that could well be due to a faulty valve, to test two or three from the set just to see, but I was quickly taught to fault find from first principles

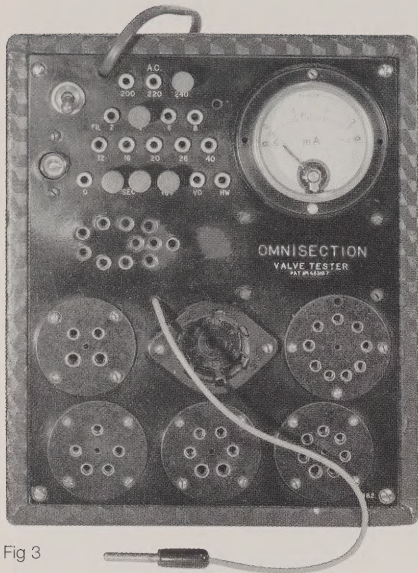


Fig 3

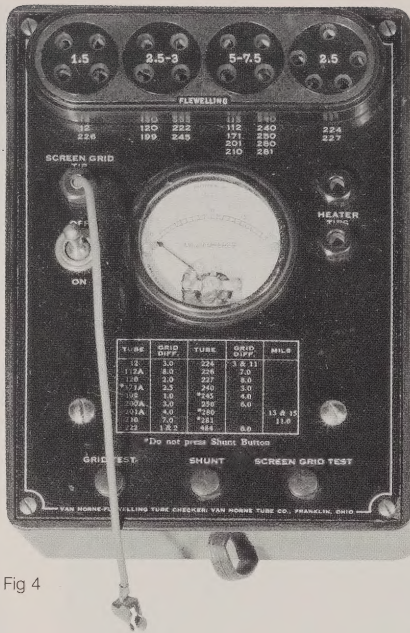


Fig 4



Fig 5



Fig 6

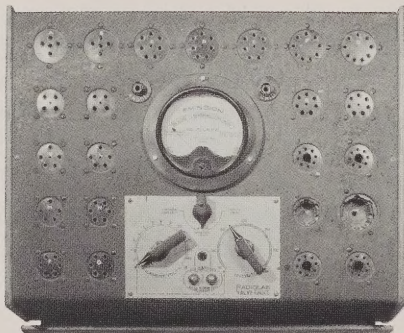


Fig 7

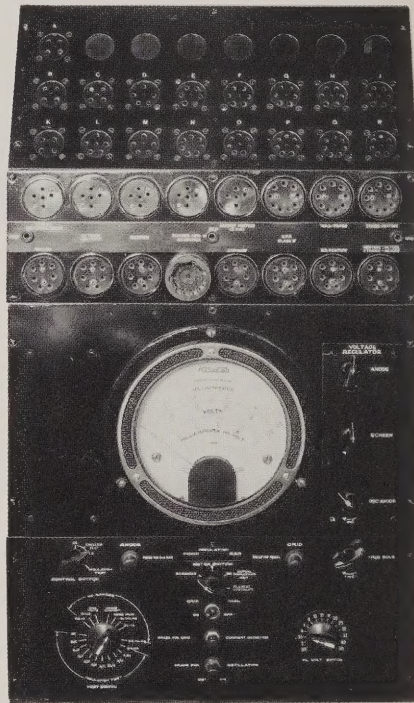


Fig 8

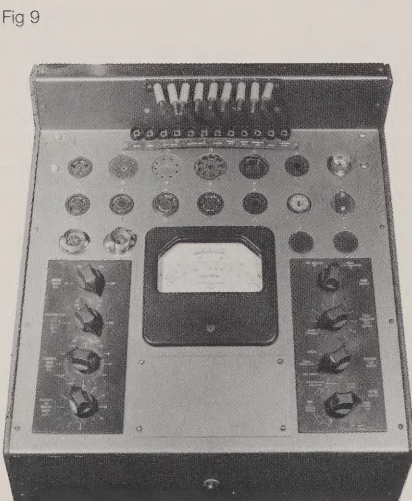


Fig 9

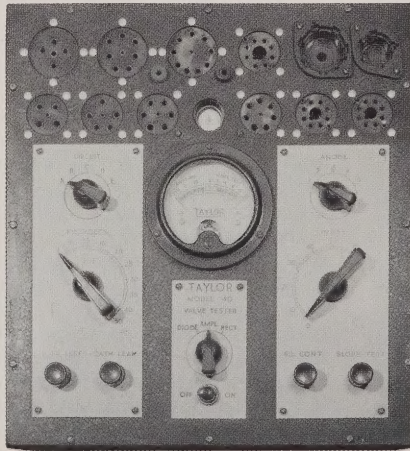


Fig 10

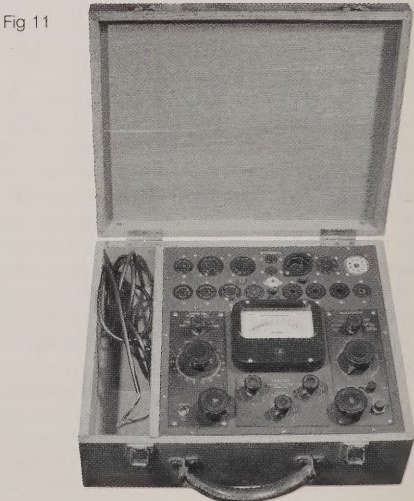


Fig 11

my connection with most things radio, but the old enthusiasm was only dormant and when I retired I lost no time in joining the BVWS. In 1985, I bought an Avo valve tester at a swapmeet in Harpenden – not the old two-part tester but a smart VCM CT160. This worked very well but I was then tempted to buy an Avo VCM Mark II. As an aside, Avo designated the original two-part instrument as a Valve Tester and all subsequent models as Valve Characteristic Meters (VCM).

There is some debate surrounding the actual value of valve testers in the radio workshop. Some of my best friends consider them a waste of space and money but their attraction to me is their often complexity and inventiveness of design and, if they go wrong, they can give you a good game in fixing them.

Valve testers can be divided broadly into two groups, the relatively simple emission testers and the more complicated instruments that measure the gm of a valve. Both kinds usually also indicate heater/cathode insulation and softness. Emission testers usually involved strapping all of a valve's electrodes together, apart from the cathode and filament, and then passing an AC current from the strapped electrodes to the cathode/filament via a DC milliammeter. The only adjustments required were the filament voltage and the anode voltage.

Testers designed to measure a valve's gm were much more complicated and were quite varied. Some merely altered the control grid voltage by a fixed amount and then measured the resultant change in anode current. The Avo two-part tester was of this type. Other more sophisticated (and expensive) testers fed an AC voltage to the control grid of the valve, which was connected as a simple amplifier, and then measured the amplified signal appearing at the anode. I hope to outline some of these testers in a later article.

Another type of instrument which is not strictly a valve tester is the set analyser or selective set analyser. These were popular in the United States but were also used here in the UK. They were intended to enable the serviceman to measure voltages and currents at each valve, without the need to remove the chassis from its cabinet. This was achieved by removing a valve from its holder and, inserting in its place, a plug with a lead to the set analyser. The valve was then plugged into the analyser and various readings taken on self-contained meters. This sounded like a great idea but ultimately failed with the introduction of high- μ valves.

Also, unless the fault turned out to be a defective valve itself, then there was no alternative to removing the chassis to permit the remedial work to be carried out. I hope to feature some set analysers in a future article.

I have now acquired a fair number of valve testers, including not only those built in the United Kingdom but also from the USA, France, Germany, Italy and Japan.

They range from testers produced in the 1920s, usually of very simple design, to some very complicated examples from the early 1970s.

The earliest that I have seen is shown in Fig 1. This was produced by Cleartron Radio Ltd (C.T.) who were selling valves in the mid '20s although I do not know whether they manufactured either the tester or their valves themselves. It required external H.T. and L.T. supplies and needed great care in operation. It was found in Cornwall by John Howes. One of the two meters measures heater volts and the other anode current. The grid is connected through one of the three push button switches to the positive side of the heater, to the anode or to the H.T. line via a resistor, hence my suggestion that care in operation was required.

Another early tester is shown in Fig 2. This is the Six-Sixty Valve and Set Tester, and, as its name implies, is a hybrid valve tester and set analyser. It could test both battery and mains triodes, screened grid valves and pentodes. It used either external power supplies or supplies taken from the set under test. The meters would read anode voltage and current up to 75 mA and

heater voltage and current. This tester was very well made and probably dates from around 1930. It was very generously given to me for my collection by Rupert.

During the 30s, many valve testers made by manufacturers, long-forgotten, came on the market. One of the simplest was the Omnisection Valve Tester shown in Fig 3. It was made by Norman Rose (Electrical) Ltd of Tottenham Court Road, London, who were big players on the retail electrical and radio scene. This tester, at £4.10.0 was described as "the finest and most complete valve emission-testing equipment yet invented" – a slight exaggeration as it is, in fact, only a very basic emission tester.

Similar testers were being manufactured in other countries, especially the USA and an example is shown in Fig 4. This is an early simple, but well made, emission tester made by Van Horne Tube Co, Franklin Ohio.

An early example from Germany, made in 1934 by Excelsior Werk Klesewetter, Leipzig is shown in Fig 5. This well-made, compact mains-powered emission tester also served as a voltage and current meter. It could also be used to measure, to a limited extent, capacitance and resistance.

An important maker of valve testers in this country during the 30's was Radiolab, soon to be absorbed by Everett Edgcombe. An early example is shown in Fig 6. This was marketed as a complete valve and set tester, and although it required external power supplies, it could function as a valve tester, set analyser and multimeter. It also had a M.W. oscillator.

Everett Edgcombe produced a wide range of test equipment including valve testers. One of these is shown in Fig 7. Styled the Radiolab Valve Gauge and produced in 1937, it could test a wide range of British and American valves including early International Octal valves. Adaptors were soon produced for Mazda Octal valves but inevitably the rapid increase in the number and variety of valve types rendered the Valve Gauge of limited use and it was soon obsolete. At around the same time, this company produced their largest and most ambitious and complex tester, shown in Fig 8. This possessed a large bank of British and American valve sockets and at that time, 1936, could handle a large variety of valves. Its internal power supplies provided variable regulated D.C. for Anode, Screen and Grid electrodes. It measured gm directly on the large meter and did so by measuring a filtered rectified A.C. signal appearing at the anode. It was quite easy to set up and appeared to be reasonably accurate when testing valves of the period but, again, it was defeated by the proliferation of valves in the late 30s and especially by the very high- μ valves which were then appearing. This very large tester was found by Ed Dinning in a Lincoln second hand shop.

Radiolab decided to solve both problems by introducing a fairly simple but well made tester in the early 40s: Fig 9. This used a system of jump leads so that any electrode voltage could be connected to any pin of a wide range of valve holders. It also made an attempt to cope with higher- μ valves. It used D.C. voltages for anode, screen and control grid, and, being quite expensive to produce, never really competed with Avo testers.

Avo had, as already mentioned, solved the problem of increasing valve variety with the introduction of their roller switch. Another British company, Taylor Instruments, was by the late 30s producing a wide range of inexpensive test gear and they introduced their model 40 Valve Tester in 1939: Fig 10. This had a simple switching system and claimed to be capable of testing over 800 valve types, which they said represented 96% of those currently in use. This was a very basic emission tester and it applied a low A.C. voltage to the strapped electrodes.

It was quickly replaced by the Taylor 45 and 47 models. These were much more versatile and, being inexpensive and easy to use, became very popular, and large numbers were produced. There are still many of them in use today. Although the electrode switching

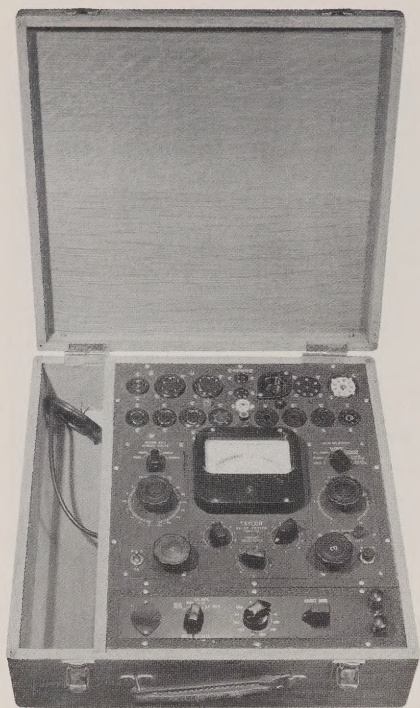


Fig 12



Fig 13



Fig 14

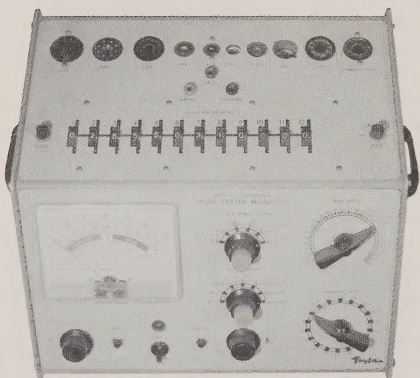


Fig 15



Fig 16



Fig 17

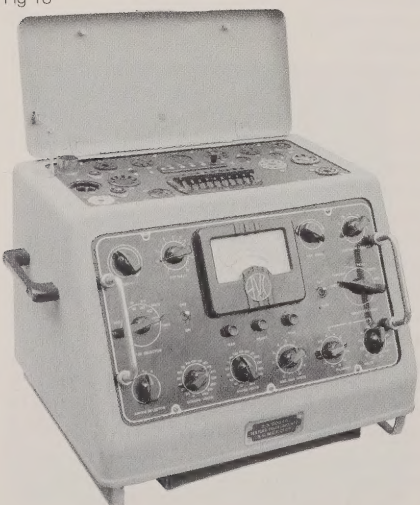


Fig 18

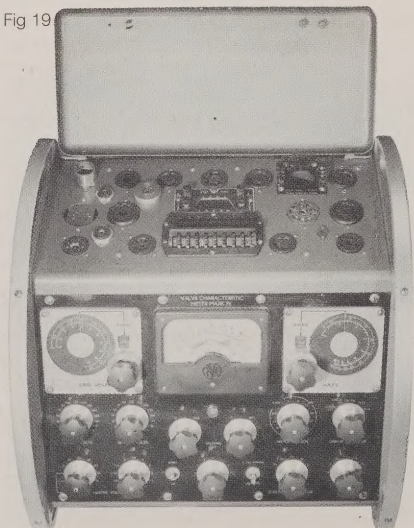


Fig 19

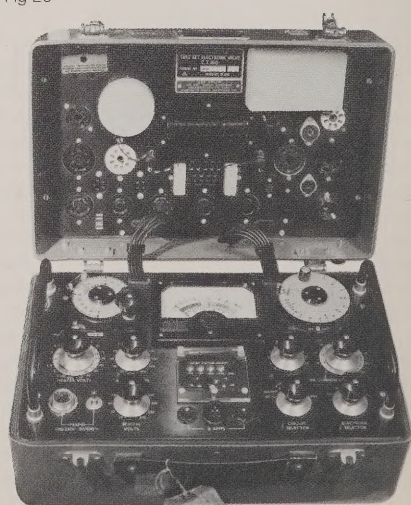


Fig 20

system enabled these testers to test a very wide range of valves, this system again ultimately proved inadequate. They were replaced by the 45A and 47A. In both cases the 47 model incorporated D.C. voltage, current and resistance facilities: Fig 11 and Fig 12. The new Taylor models were the 45B and 45C: Fig 13 and Fig 14.

They were very compact and easy to use. All the Taylor Valve Testers so far were of the simple "Good" or "Replace" kind: they had a very limited selection of anode and screen voltages, and being of the zero bias category, had to operate at the lower end of the curve when testing high current valves. The last Taylor valve testers produced were the 45D, Fig 15 and 45D2. These did give an approximate indication of anode current and had variable grid volts of up to 25v. Soon after Taylors were taken over by Avo in the early 70s, production ceased.

Compared with Taylors, the Avo testers were always considered to be more upmarket. They were of course more expensive, but they were soundly engineered and, right from their first Valve Characteristic Meter, the Mark I, Fig 16, they provided a wide range of screen, anode and control grid volts, and, using their roller switching system, a very wide range of valves could be tested.

They could measure anode and screen current accurately and also the actual gm and any electrode leakage. Avo retained this basic design for many years. Later models were the Mark II, virtually identical to the Mark I except for the chrome handles on the Mark II, Fig 17. The Mark III, Fig 18 and the Mark IV, Fig 19 had more sophisticated controls for the application of grid volts and more measures to prevent parasitic oscillation in the higher mu valves. Avo also produced the CT160 Valve Characteristic Meter, Fig 20 Originally designed for civilian use as the VT160 as well as for armed forces use, it ended up almost entirely in Army and Navy use. Its only drawback compared with other Avo testers was that it was slightly more difficult to use and had a very sensitive meter, 30μA, which was prone to failure. The last tester produced by Avo was the VCM 163, Fig 21, a fine instrument that could present simultaneously on two meters both Anode Current and gm. It was of advanced design and used solid state circuitry, feeding a signal of 15Kc/s into the grid circuit of the valve under test and measuring the amplified signal at the anode. It could test the widest range of valves, but did need adaptors for most pre-octal types other than British 4 and 5 pin types. This tester is very highly regarded and is in demand not only in the UK but also in the Far East.

The other major manufacturer in this country was Mullard, a subsidiary of Philips, which produced a wide range of high quality test equipment. They produced, in 1938, the highly innovative Master Test Board, Fig 22. This was very simple to use, requiring no setting up for

individual valves, only the insertion of a paxolin card specific to the valve type. The company supplied with the tester a range of cards which covered a wide range of valves. In essence, however, it was again only a good/replace tester giving a reading on a meter. It was built to a high specification and its supply voltages were regulated D.C. – the beehive neon stabilisers must have impressed customers. It also supplied cards enabling it to be used as a multimeter, measuring A.C. and D.C. voltage and current as well as resistance and capacitance. Its disadvantage was its size and weight and, with the boxes of cards took much workshop space. This impressive tester was given to me by Mike Hill. It was replaced after the war by the well-known Mullard High Speed Tester, Fig 23.

This again was easy to use and built to a high specification, using stabilised D.C. supplies for valve electrodes. It used ingenious circuitry whereby whether the valve was acceptable or not was indicated by the position of a green spot on a small C.R.T. Once more it took much space and, because multi-electrode valves could require up to four cards; a complete set of cards totalled over 1500, making the whole arrangement very bulky and heavy. There are many of these testers still in use and they are justifiably very popular.

During the 1930s and onwards, many manufacturers in other countries were producing valve testers of varying complexity. In the United States in particular, Weston, Supreme, Readrite, Hickock and others were producing some high standard tube checkers. Most of these companies specialised at first with the set analyser type but, for the same reasons as in this country, they abandoned these and concentrated on tube checkers. Cheaper ones were of the emission type, registering Good/Replace on a meter, and some, such as the Hickock illustrated, Fig 24, embodied a long paper roller containing valve settings and measured GM with ingenious circuitry. Quite a few were distributed in the British market, and the model shown was modified to deal with British valves and mains voltages. Another United States manufacturer, Radio City, also made valve testers modified for the British market, and their model 314 is shown, Fig 25. This is quite common.

Germany produced some fine testers in the '30s and '40s. One from the mid-forties was the We 252 made by Josef Neuberger of Munich, Fig 26. This quite complicated tester was essentially an emission tester but it also served as a multimeter covering capacities as well as the usual ranges. Another German example dating from the fifties is shown in Fig 27. This was made by Max Funke and to some extent followed the example of Mullard in that a set of cards, 1600 of them, was used to achieve the switching required for different

Compared with Taylors, the Avo testers were always considered to be more upmarket. They were of course more expensive, but they were soundly engineered.

Fig 21

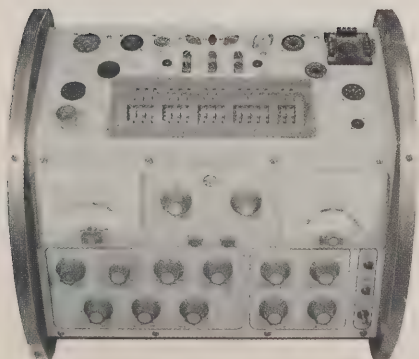


Fig 22



Fig 23





Fig 24

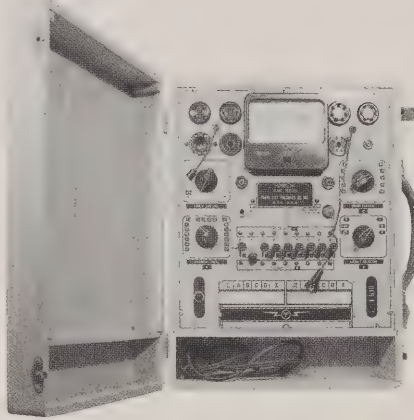


Fig 25



Fig 26



Fig 27



Fig 28

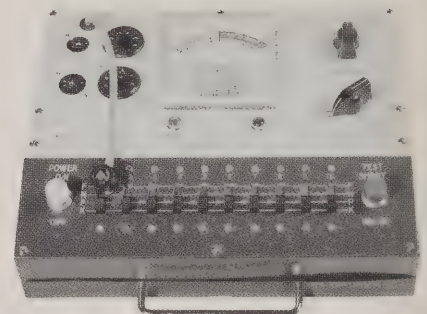


Fig 29

Fig 30



Fig 31



Fig 32



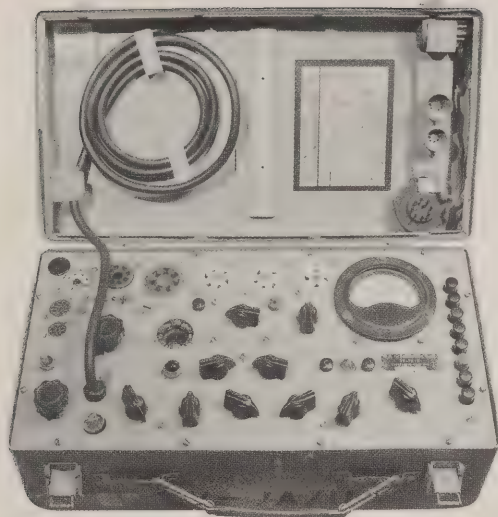


Fig 33



Fig 34

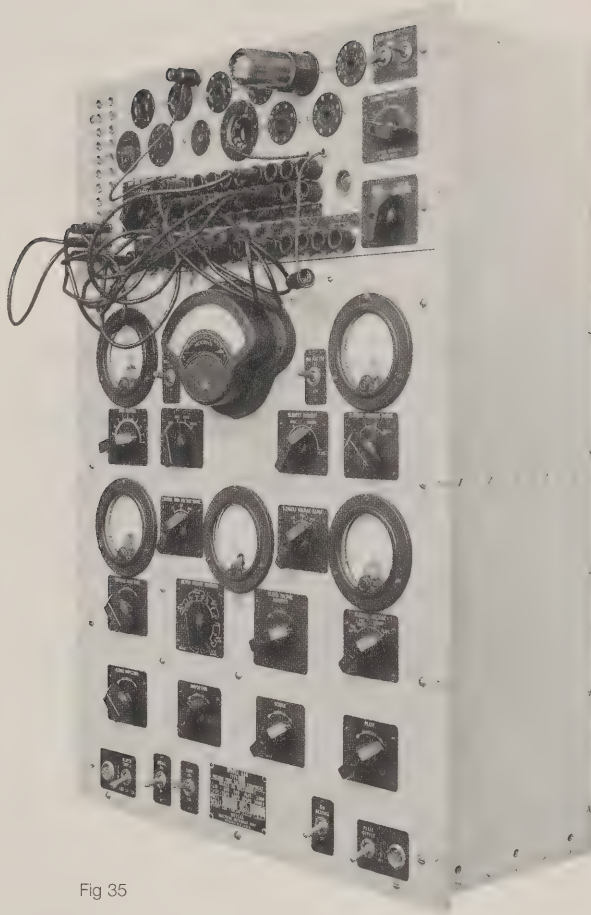


Fig 35

valves. The difference was that a series of wander plugs, up to 13, was required to be inserted through the card into the tester. Thus, user error was impossible (provided the correct card had been selected) but setting up took a little time.

Many other countries produced testers; examples from Italy, Fig 28 and a most rudimentary but effective one from Japan, Fig 29 are shown.

The Second World War resulted in the development of rugged testers designed for Services use. In this country, there was the RAF Valve Tester Type 4 and 4a, Fig 30, a heavy robust tester in a solid teak case made by Taylors – a far cry from their much lower specification testers produced up until then. There are still some of these in use and earlier versions do have the facility of being able to test very large valves such as the DET25 with its special British L4 base.

The USA introduced their famous I 177 Fig 31 and large numbers are still seen in this country. They were made by various manufacturers and small differences are found. It was of the usual Good/Reject type of emission tester and its use was later extended by the introduction of the Tube Socket Adapter Kit MX 949/u, Fig 32. The United States produced several valve testers for armed forces use after the War. One was the TV7, Fig 33. This, in common with other US testers, was engineered to a very high standard. Also, again as with other testers, the most comprehensive operating and servicing instructions are available.

The British armed forces adopted the Avo Mk II and CT160, as mentioned above, for Army and Navy use after the War, while the RAF continued to use the Valve Tester Mk IV and a modified version of the Mullard High Speed tester.

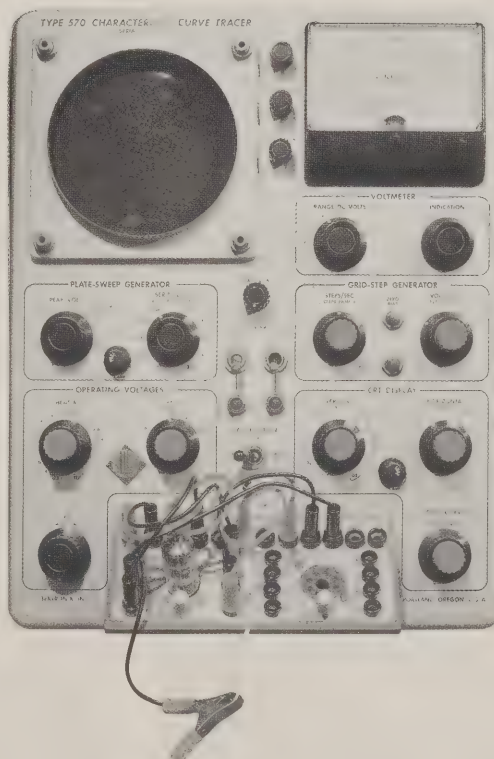


Fig 36

continued on page 19

Harpenden September swapmeet/Talking About Wireless special

Don McLean "Restoring Baird's Image" 2nd September 2001

The small hall at Harpenden was packed in anticipation of a fascinating talk. We were not to be disappointed but it nearly didn't happen at all! An un-named guilty party who just happens to be our chairman forgot to bring the video projector. A quick trip back to Swindon saved the day.

The presentation was meticulously prepared and superbly delivered. I have never seen PowerPoint used to such good effect. The graphics and moving image clips perfectly complemented the talk.

The talk was the result of many years of research. 30 line TV could be recorded on a 78rpm gramophone disc and this was done both by Baird and enthusiasts. Don has found these recordings and used computers to process and restore the images. Contrary to popular opinion he has



conclusively shown that Baird's 30 line TV transmissions in the early 1930s were more than just a novelty. Within the limits of the medium the productions were of high quality and offered real entertainment value. Don has even been able to identify the performers on some of the discs, notably Betty Bolton and the Paramount Astoria Girls.

The IEE had a bookstall offering many of their vintage radio related titles at good discounts. Don was signing copies of his book, also called "Restoring Baird's Image". They sold out completely.

By the time you read this we will have staged another "Talking About Wireless" at the November Harpenden. If all goes well you will have had the rare opportunity to see a demonstration of spark transmission plus a

talk about the history and design of coils.

We are always planning for future Talks About Wireless. The next session will be at either the June or November 2002 Harpenden. If you would like to give a talk and/or demonstration please contact me. If you give a talk we will meet reasonable expenses and give you a free year's membership of the BWWS.

Jeffrey Borinsky, 3 Woodberry Grove, London N12 0DN
Phone: 020 8343 8121
Email: jeffrey@borinsky.demon.co.uk

Talking about Wireless - The Video

Members may be interested to know that the Society is video taping some of the lectures being given at Harpenden, primarily for the Societies archives.

The first video entitled 'Restoring Baird's image' is of the memorable lecture given by Don McClean at the 2nd September 2001 event. The programme runs for approximately 50 minutes.

A small number of copies are available to society members on VHS (PAL only) priced at £10.00 each which includes postage and packing (U.K.) For overseas members, postage will be an additional cost, please enquire beforehand.

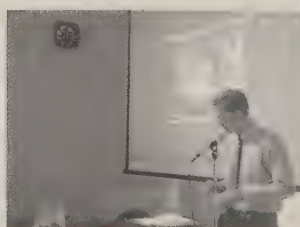
To order your copy, please make your cheque payable to Terry Martini not BWWS and send to: 122b Cannon Street Road, Whitechapel, London E1 2LH.

Facing page: Various stalls at the September Harpenden

This page, top right: A mechanical Television in action.

Left: Jeffrey Borinsky, Don McLean and Mike Harrison from the Tesla Coil Group.

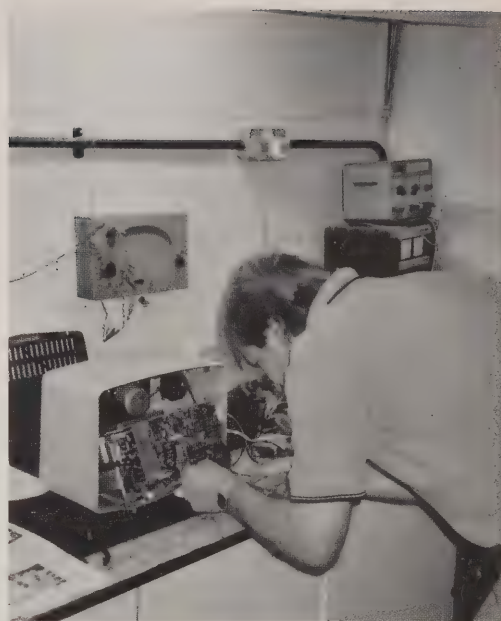
Below: Images from Terry Martini's recording of Don McLean's lecture



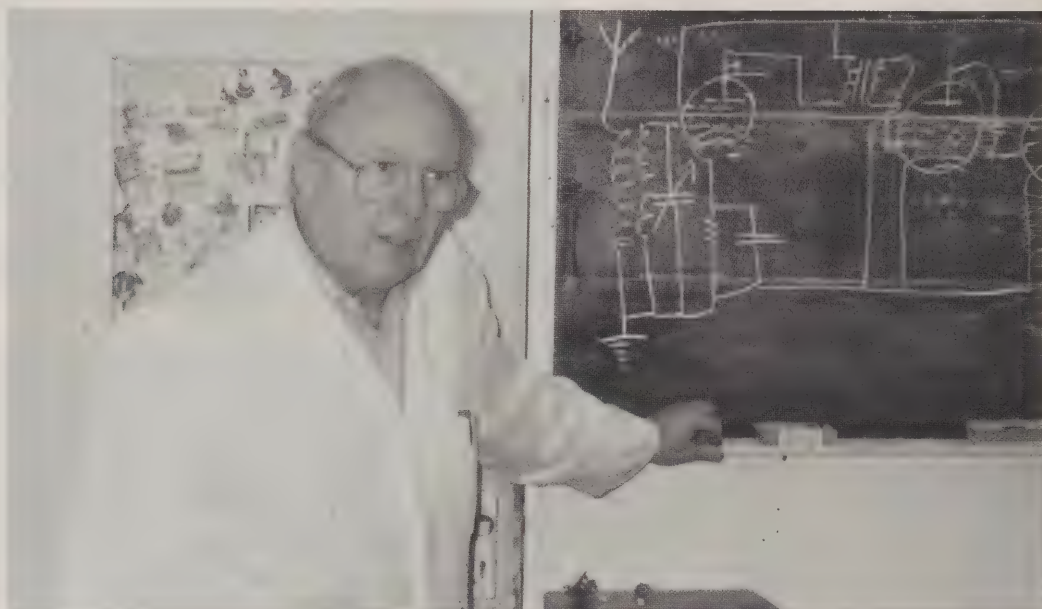
Wireless Workshop Day - An Attendee's Review.

By John R. Sully, photography by Terry Martini

Whatever the basis for a collection of wireless receivers, the interest is usually enhanced if the sets are working well. For some this is not a worry; a good few BWWS members might have spent years in the wireless trade so are quite able to keep their sets in good electrical repair. But for those of us too young to remember the valve era, or who were not directly involved in it, repair of wireless receivers can be a problem. A couple of books have been published that address that need, and of course one can always find period repair manuals. But for practical demonstration and investigation there is another answer – Gerry Well's wireless repair Workshops. For twenty-five pounds a day of instruction with one of the most respected technical specialists in the field seemed good value, and here follows a review of the day.



The sets brought by the delegates were quite varied, covering a time span from the early 1930's to the late 1950's, and perhaps to be expected, all were Superhets.



Gerry Wells led the Workshop, and was assisted by Terry Martini, who also has a very strong practical knowledge of wireless repair. The class can cater for up to six delegates, each attendee being invited to bring two wireless sets for repair. For the August session there were four delegates present: Luke Parker, George Smith, David Smyth and myself.

The day starts with tea and biscuits where the attendees are introduced, and the format of the day outlined, before delegates adjourn to the specially equipped workshop with their sets. Each delegate has his own bench space equipped with AVO Meter, soldering iron and basic tools etc. Gerry then described the basic operation of a Superhet receiver, starting with the signal input at the aerial, and progressing through the valve stages. With some basic faultfinding techniques outlined, it was then time to look at our individual sets. Gerry or Terry then examine the symptoms of each receiver in turn, taking voltage measurements where necessary, and suggest possible faults and cures, with explanations as to how the diagnosis was arrived at. On the older sets Gerry recommended a visual inspection before power up, and

pointed out components that would almost certainly have failed, or would be a future liability. The actual replacement of components is undertaken by delegates, and whilst delegates are changing components and cleaning up replacements for their own sets Gerry and Terry are able to assist the other attendees. There are tea breaks throughout the day, as well as a cooked lunch, included in the cost.

The sets brought by the delegates were quite varied, covering a time span from the early 1930's to the late 1950's, and perhaps to be expected, all were Superhets. The problems identified were surprisingly obvious sometimes; as evidenced in a brief list of the faults found in our receivers:

Luke Parker took a 1950's Ekco U319, which needed only a new UY85 rectifier valve to restore sound. Post-war valves can be less reliable than those used pre-war. He also had a Bush VHF90, where a visual inspection revealed an open circuit wirewound resistor that had visibly overheated. However, when a new one was fitted this also immediately burnt out. Further investigation revealed that the mains interference filter capacitor had failed, and this was removed as it was considered no

longer necessary. A further replacement wirewound resistor had the Bush working fine.

George Smith took a Pilot 'Little Maestro' in which a failed scale bulb had interrupted the valve heater chain; just a new lamp brought the set back working. George also had a small 1950's Champion 825. Voltage checks on this set identified a "leaking" coupling capacitor, and following replacement of the component the set was restored to life.

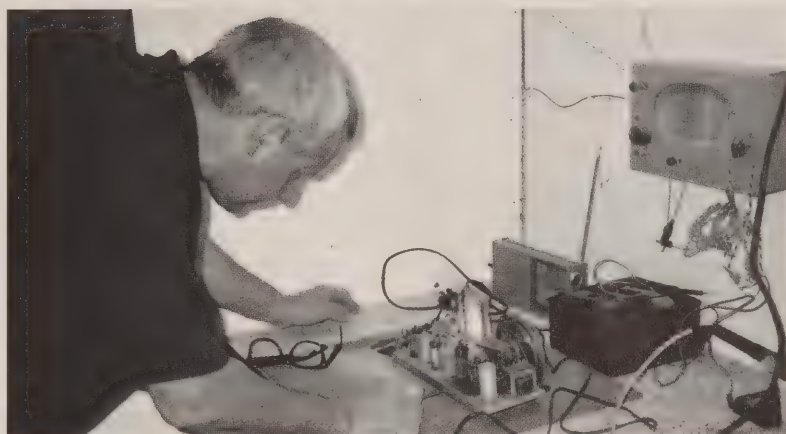
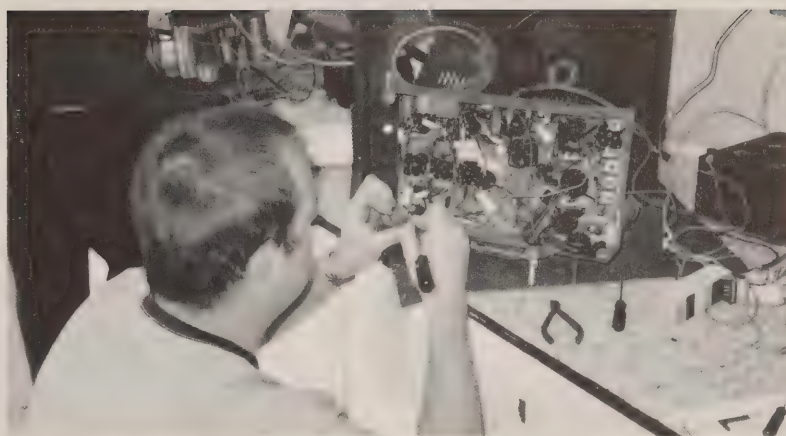
Dave Smyth took a mid-1930's Ferguson 602, which was suffering from low sound output. Re-alignment of the set alone produced a marked volume increase, though Dave had previously replaced most of the capacitors as a preventative measure anyway. It was also noted that the volume control appeared to be a 1920's era component (replaced perhaps during war shortages). This was swapped for a more appropriate potentiometer. Dave also had a late 1930's HMV 442. Here an open circuit resistor was identified in the first stage by checking voltages at the valve pins. Two capacitors were also replaced to cure distortion, after which the set worked well.

I took a Murphy A24. Initial visual inspection revealed that replacement smoothing electrolytics fitted by a previous owner had not been soldered properly, and were connected at the wrong point anyway. A couple of visibly bad capacitors were also replaced. Sound output was still poor though and attention focused on a replacement output transformer that appeared to be from a 1950's Vidor! This was considered not "meaty" enough for a 1934 Murphy so was changed for something more appropriate, which improved sound quality. I also took a Philco 471, which shares a similar chassis to the "Peoples Sets". Here an inspection before power-up revealed replacement smoothing electrolytics covered in fur. Having changed these a further coupling condenser was found to have failed. The set then worked, but not for long, as a loudspeaker condenser shocked by current flow after decades of inaction overheated and melted. Replacing this brought the set to life again.

That preceding quick run through of the problems identified demonstrates one worthwhile lesson, namely "Don't ignore the obvious". Check all lamps. If a capacitor is oozing gunge replace it – it's never likely to work again (certainly not reliably). Check voltages around the valve pins, and suspect adjacent components if voltage is absent. Look for and replace charred components. Check that existing replacement components are correctly soldered and positioned.

By the end of the day, everyone had both their sets working, and all felt that they had learned from their time. That said, one day is simply not enough to learn all there is to know about wireless repair, so further reading of reference books would be required. The day does give the attendee confidence to start the process of faultfinding though. No previous knowledge is required, though the ability to use a testmeter and solder proficiently is to be recommended. The instruction provided by Gerry and Terry was always helpful and informative, no matter how daft the question! The style is more that of a friend or neighbour giving advice rather than a lecture-type lesson.

Some years ago Fraser Donachie argued in a Bulletin article that receivers should be left untouched, but I have to say that to my mind, attractive as some cabinets may be, their primary purpose is to generate audio entertainment, and to that end should be capable of demonstrating that function. We have all seen and complained about some of the bizarre and sometimes downright dangerous repairs carried out by previous owners, and this Workshop is a valuable introduction on how to go about the task in a methodical manner. So for less than the price of a DAC90, you should gain the knowledge to be able to at least start to get some of those sets in your collection working. Recommended.



Bernard Wilkie recalls his first visit to the BBC's Lime Grove

by Bernard Wilkie

It seems strange, but in the weeks I'd been working at TV Centre I had not once set foot in a TV studio. Now I would visit The Grove and see for myself the place where the programmes were made and routed to the transmitters. With a feeling of anticipation bordering on excitement I set off for the studios.

Television Centre and Lime Grove Studios were just over a quarter of a mile apart and although the route was bisected by the busy Uxbridge Road, it was an easy walk from one to the other. In those days I used to go to the White Horse for lunch, a large and pleasant pub near the market, which served good beer, sandwiches and pies. Leaning on the bar and listening to the conversation of people around me, I realised that other members of BBC Television went there too, but I was too much of a new boy to recognise any of them.

As a member of staff I was permitted to enter BBC premises anywhere in the country and during my six years in engineering I had already visited Broadcasting House, the Langham Hotel, Bush House and several of the transmitter sites around the country; now I was about to add Lime Grove to the list.

I knew what the building looked like because pictures of the main entrance were screened night after night on the box, as viewers were shown famous people going in and out and celebrities with shiny limousines being greeted by commissionaires in smart uniforms. The Grove was the nearest thing to Hollywood that Britain possessed and although it lacked the searchlights and the police holding back the crowds, I felt proud that it belonged to the BBC.

Lime Grove, once the home of Gainsborough Pictures, had produced movies every bit as celebrated as those made by other famous British studios such as Ealing, Pinewood and Elstree—and now I was going to see it for myself. I was about to enter the studios where so many of the films my boyhood chums and I had paid sixpence to see (one shilling and sixpence and a bar of chocolate if we were trying to impress a new girl friend).

I walked down Lime Grove and there it was, a huge building in a street of suburban houses. There was the line of shiny cars parked alongside the kerb and there was the commissionaire moving about outside. I slowed my pace wanting to take it all in, then, not wishing to appear like some gawping peasant I got to the entrance doors and swept inside.

The reception area was far bigger and posher than the one in TV Centre and it had a much grander reception desk. Instead of a solitary commissionaire and his Daily Mirror, there were three beautiful girls who could have come straight out of Cosmopolitan or Harper's Bazaar. At that moment they were all engaged in telephone conversations and with beautifully manicured hands they wrote in smart appointment books. Occasionally one would call across to the people sitting in the chairs around the walls with such messages as, "Mr Onassis, would you please go to the press suite?" and "Your Grace, they're waiting for you in make up". It was the 'busy scene' from a thousand Hollywood movies. As one phone was replaced on its cradle another would be picked up. Standing at the desk I tried to look important and glanced at my watch,

but it made no difference; their experience enabled them to judge a person at a glance and my fifty shilling suit obviously put me at the lower end of the scale—if not off it altogether.

Eventually two of the phones stayed silent long enough for one of the girls to notice me. With a voice straight from the deep-freeze she asked me what I wanted. I said I wanted to look around.

Bateman with his cartoons of 'The man who sat in the oldest member's chair at The Carlton Club' could not have captured the look on that girl's face—all of their faces in fact, because they all seemed to hear my response. My girl looked at the other two in disbelief. "You want to look around?", she asked incredulously. Her voice had changed from cut glass to Dame Edith Evans in *The Importance of Being Earnest*.

"You want to look around?!!"

By now even those sitting in the chairs behind me were beginning to take an interest. They sensed that they were about to witness someone being dragged away by the police. As the commissionaire moved across to cut off my retreat I explained that I had just started work in Design Department and because I needed to know the layout of the studios I, er, wanted to look around please.

She waved me to an empty chair and, after a fiercely whispered conversation with the other girls, telephoned someone. These were the days before we were issued with identity cards and the only way she could confirm my story was for her to phone someone in authority.

At that time Lime Grove was constantly under siege. Reporters hoping to get celebrity interviews, agents trying to promote their clients, lunatics intent upon destroying this instrument of the devil and viewers who had written plays or wanted to submit their ideas jostled for space on the pavement outside with bus loads of autograph hunters. And all these had to be recognised and separated from the politicians, actors and celebrities who came to appear in programmes. Until that moment, I gathered, the receptionists had never encountered anyone who wanted 'to look around'.

Eventually I was summoned back to the desk and told that I could go into the building but that I must not enter any of the studios, nor any of the other areas that I was hoping to see. I must not approach actors or impede anyone working anywhere, but I was free to use the canteen. The directions of its location and the rules for using it were spelled out to me and, watched by the people in the chairs I slunk off. Going through the opening by the reception desk I turned right but a commissionaire stepped in front of me.

"Not that way. That's the Hexecutive Suite!" he bellowed in a voice that could be heard in the street outside and I saw flecks of saliva around his mouth. Like a character in a Whitehall farce, I walked backwards swivelling clumsily and exiting stage left.

Lime Grove was always a dark place. Subterranean corridors sparsely illuminated by naked bulbs or inadequate and dirty fluorescent tubes were occasionally lit by thin shafts of daylight filtering down the iron staircases that served as fire escapes from the studios above. No-one down below was able to tell whether it was cloudy or sunny but you did know when it was raining because everything in the basement dripped,

As a member of staff I was permitted to enter BBC premises anywhere in the country and during my six years in engineering I had already visited Broadcasting House, the Langham Hotel, Bush House and several of the transmitter sites around the country; now I was about to add Lime Grove to the list.

even the light fittings. Conditions in that corridor seemed more akin to those of a Victorian prison than the centre of electronic entertainment and yet this was the main thoroughfare to some of the offices and ancillary buildings. I'm convinced there were places in that corridor that had never been seen by human eye. But this was the way to the canteen so I followed the instructions I had been given at the desk. Above head height, but only just, were pipes, tubes and conduits that would have made the Pompidou Centre look like a billiard table. Of every diameter and description they hung from the ceiling on dusty iron supports.

I could see daylight at the end of the corridor but before I'd gone that far I came across a lift. From its location I assumed it was the one that passed through reception because I'd seen its doors open and close a dozen times while I was waiting and I'd noticed that while the outer door and fascia were relatively modern the lift was antique with folding lattice doors and big brass press buttons for up and down. I decided to forego the gastronomic delights in the canteen and, instead, go on a tour of the building—after all, that's what I'd come for.

I pressed the button on the wall, but then I remembered that the lift was controlled by an attendant and not wanting to meet up with anyone in authority I dived up the staircase wrapped around it.

In its heyday Lime Grove was the film studio where my favourite comedian, Will Hay had made all those wonderful comedies—or so I believed at the time. Later I found out that he'd also made films at Islington and Ealing, but now as I climbed the stairs I gently caressed the handrail wondering if traces of his finger-prints survived somewhere along its length. Will Hay died from cancer in 1949 but I like to think that had he lived he might have appeared on television—and I might have met him.

I went to the top floor intending to work my way

downwards but not far from the lift I found two studios one of which, despite having all the lights on and its scene doors wide open was obviously empty. Looking round to see if anyone had spotted me I went in. It was magic. Not since my days in the German theatre at Bad Eilsen had I felt like this. Multiple banks of lights hung from the ceiling while around the walls were neatly stacked bunches of scene braces and stage weights. This was Studio E and although I couldn't foresee the future it was the studio where I would spend hours and hours of my future working life. At the far end of the studio I noticed the control room. It was a very modest affair raised just slightly above the level of the studio floor, but I'd never seen a control room before and it looked very grand and highly technical. The multi-coloured pilot lights showed the equipment was switched on and I could see the monitors behind the huge sheet of plate glass that looked across the studio floor; it seemed to me like the bridge of a ship.

Concerned that someone might come in and ask me what I was doing I left and went back to the stairs. Opposite Studio E was Studio D but the doors were shut and the iron levers on the outside that sealed the studio against noise were firmly in the closed position. I carried on down.

On the way I passed Studio G which was also closed and a red light outside was on, which I assumed meant they were recording a programme. I tiptoed back to the Victorian prison and found my way to the canteen.

It had been an exciting introduction to the hub of the industry and, despite the fact that the only studio I had been in had been bare, I was more determined than ever to get a permanent job in television.

Excerpt from the book 'A terrible effect on the BBC'
by Bernard Wilkie.

Conditions in that corridor seemed more akin to those of a Victorian prison than the centre of electronic entertainment and yet this was the main thoroughfare to some of the offices and ancillary buildings.

Valve Testers continued from page 13

Finally, are shown those large testers produced in the 1960s. First the French Metrix 61B, a large and very heavy tester, Fig 34. It had a wide range of heater voltages and stabilised DC Anode voltages of up to 300v at 100MA, two auxiliary DC supplies for screen and other electrodes, and control grid volts up to 50v. All of these supplies could be indicated separately on five meters, and almost any valve could be tested using a range of adapters and a switching system that permitted any electrode to be connected to any valvholder pin. It did not feature an automatic gm readout but, given the flexible voltage supplies, this presented no special disadvantage. It bears an RAF reference number but, given its size and weight, could never have been used for front-line servicing, so perhaps it came from an RAF design laboratory. It was found for me in Lancashire at a surplus dealers by Malcolm Bulcock.

The second tester is the Weston 686, Fig 35. This again, like the Metrix, is a large and very heavy tester, and as with most Weston testers, is superbly engineered. It has fully stabilised electrode supplies, all of which can be metered, and a gm readout. It can test almost any valve and the pin connections are made by jump leads. Thus, although extremely accurate, it is rather cumbersome to set up and, again, was presumably intended for laboratory use. It was found for me in Chicago and driven across the USA for transportation by Phil Taylor and John Howes – a heavy task!

The third tester is the Tektronic 570, Fig 36. This is a large tester designed primarily to display simultaneously on a CRT five characteristic curves of the valve under test. Power supplies are massive and well controlled and metered. As might be imagined, the circuitry is complex and it employs 36 valves, fan cooled. It can test almost

any valve through a range of screw-in adaptors. Setting up is by jump leads so once more this fine tester must have been intended for laboratory use. Tom Hodgson of North Carolina was of substantial help in providing information and spares to enable me to get the tester working, as indeed he was with other US testers. I am also grateful to Alan Douglas for information about American testers, both in correspondence and in his highly informative articles.

I am frequently asked to advise on the best valve tester to buy. In my own workshop I tend to use the Mullard High Speed Tester when wanting to make a quick and rough test of a mixed box of valves. For any other purpose, such as a more accurate check, selecting a matched pair of valves or finding the best of a few valves of the same type, I would use one of the Avo "sloping front" testers, more often than not, the Mark I or II, or perhaps the VCM163. It follows then that my advice would be to buy any one of these testers, and in terms of value for money and reliability, then probably the Mark I or II. These can still be found for about £100 and can be quite easily overhauled; in fact there is a most informative article on this subject in a recent issue of *the Radiophile* by Gary Tempest. Over the years I have inevitably accumulated a good number of manuals and other information relating to valve testers, and am always very happy to assist members in need with copies.

Finally my thanks to my daughter Pamela who deciphered and transcribed this article and to Gary Tempest who first encouraged me to write it and to Carl Glover who has taken the photographs, edited and arranged it. I'd also like to thank my wife for putting up with several tons worth of valve testers in the loft which are liable to come crashing down through the roof at any time!

Mending a Beehive

by Gary Tempest

Actually this is a radio by Zenith, Model 5-R-312, but in the US it is called a Beehive and falls into the category of Machine Age. (Americans seem to like group names for radios). It was made in 1939 and I suppose it is called Machine Age because of its strong lines and functional look. Good ones sell for around \$200 but I got mine for \$50 and even had it brought over, by a friend, for nothing. So what's wrong with it, or was?

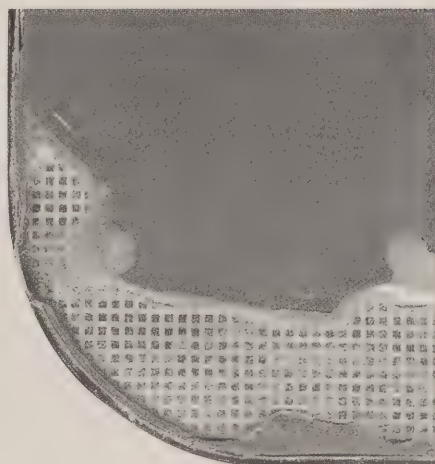
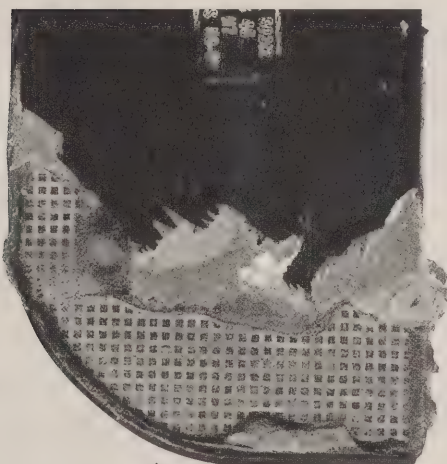


The first step was to cut a piece of perforated zinc plated steel sheet to fit neatly over the hole on the inside. I cut it crudely with tin-snips and then used a bench grindstone to quickly get it to the right shape.

Well it was all complete apart from 20% of the Bakelite bottom being missing and two pushbuttons. Rather surprisingly, when the chunk broke out no cracks radiated from it to either the sides or the front. The rest of the case was in good order and there were no chips out of the grill bars, which is often the case. It is a rather odd piece of moulding: the bottom is definitely the 'weakest link'. Apart from a couple of inch-wide runners, for the chassis fixing bars, where the thickness is say 5mm, the rest is a mere 3mm. Even this is weakened by the recessed holes, for the chassis fixing screws, and holes right through, in the 3mm, for small rubber feet. The chassis, when I removed it, was very original apart from some repairs obviously made long ago. The great thing about a lot of Zeniths is that the smart gold paint finish is over copper plate on the steel chassis, so not a trace of rust. It was going to need a replacement speaker as the original, an EM type, had virtually no paper cone left.

I started by cleaning the cabinet and then left it near to my favourite chair in the conservatory. Over the next few weeks I would pick it up and ponder different ways to make a repair. Eventually, I settled on a method. The first step was to cut a piece of perforated zinc plated steel sheet to fit neatly over the hole on the inside. I cut it crudely with tin-snips and then used a bench grindstone to quickly get it to the right shape. It overlapped the break, on the bulk side of the repair, right up to the runner for the chassis fixing. On the other side it overlapped a remaining small piece still part of the cabinet. Now I know from repairing cars that it is most important to have repair patches securely held in place before applying resin and hardener, otherwise you get in a terrible mess. So firstly I had to prepare the cabinet. A mini drill with a dentist's burr is excellent for cleaning and roughening edges and the inside of the cabinet. Another good trick is to drill lots of small holes into the surface, so that they go say half way to the outside. To fix the metal plate (available from Maplin, code WC86T) I drilled a pair of small holes, able to take 24 SWG tinned copper wire, either side of a perforation. I did this several times securing the sheet as I went. Because I had it, I used a round tipped dental burr to grind a small recess so that the wire could remain in place, once the bottom was sanded off, but this is really unnecessary. With the plate

secured I then stood the cabinet on some paper and used an old teaspoon to dribble David's Isocon resin, mixed with hardener through the sheet where it overlapped the Bakelite. Once set, it was amazing how rigid the cabinet felt already. After preparing the rest of the cabinet bottom, and half an inch up the front and side, I accurately cut a layer of glass fibre cloth and laid this in the prepared area. Then it was the quite pleasant task of stippling more resin mix through the cloth. Once set I repeated with another layer. I should say that I avoided the two raised runners, for the chassis fixing bars. My plan was to build up the base so that it would be flat and this thickness all over. This was needed because a couple of cracks had started outwards from the original break anyway. There is a good tip I can pass on here. Always drill a small hole 2-3mm in diameter, at the very end of a crack. This prevents the extension of it, by spreading the stress from the original pinpoint all around the circumference of the hole. On the outside, where there was a depression, the process was repeated by laying up and bonding three layers of cloth. I stippled the cloth into place so that it went up the sides of the break. Inside I needed only to use David's smooth filler paste to level the repair out. On the outside before the smooth paste, I used David's heavy-duty paste containing chopped glass fibre strands. The bottom was very strong now and I had even filled in the recesses for the chassis fixing screws. To me flatter screws seemed a better option, and I could even grind the head thickness down, with large penny washers coupled with slightly higher rubber feet. The feet shown in the pictures are about twice as high as they need be. I do intend to find shorter ones which will improve the appearance. On to the laborious part of sanding down, made better by two orbital machine sanders, one large and the other a small triangular type for getting into the internal corners. A facemask was essential by the way. I finished off on the outside with various grades of wet and dry used wet. I sprayed the whole bottom, inside and out, after masking off, with Halfords car repair paint in Vauxhall Brazil Brown, which is an excellent colour match. No primer was used, which I don't think is essential, as the surface is not metal, so that in future if the paint is chipped it has a fair chance of being brown underneath. To finish I left the cabinet for a couple of weeks before rubbing out the



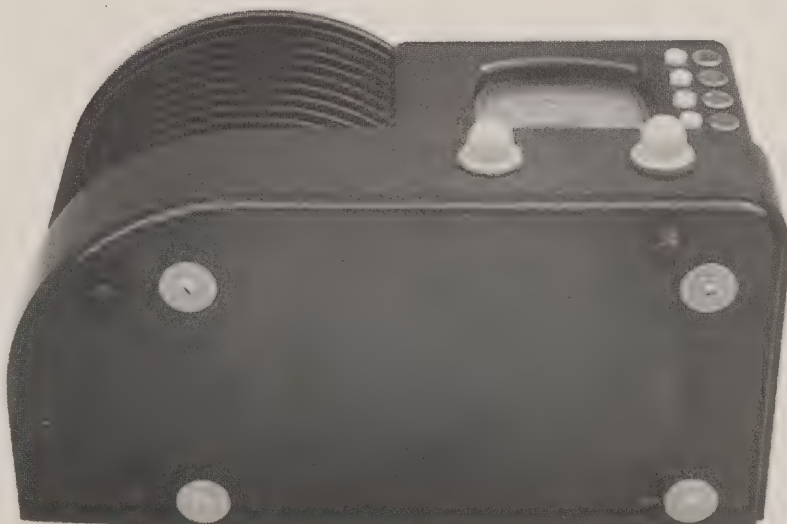
Far left: The bottom of the Zenith showing the hole and steel mesh.

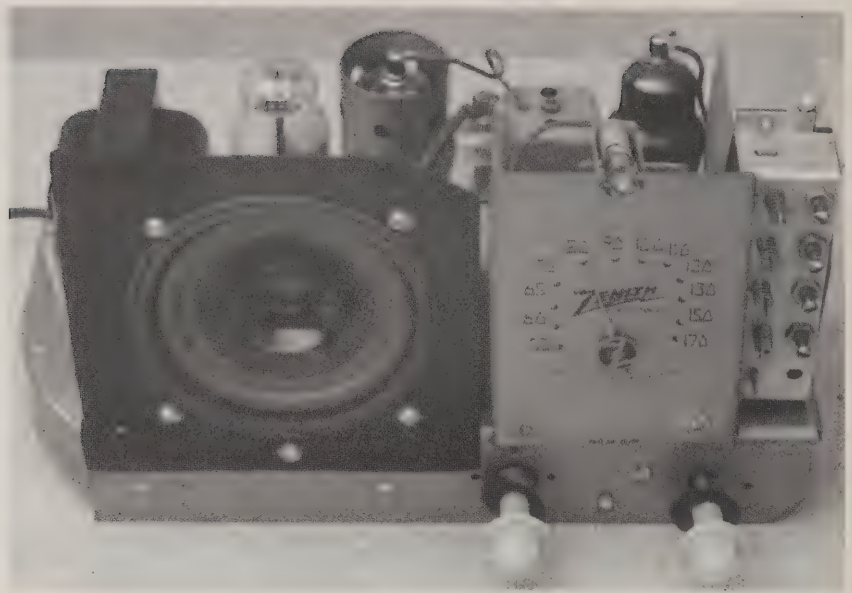
Left: Still showing the hole but 'tidied up' prior to the application of fibreglass.

Below: the repaired hole.

underside with fine wet paper and metal polish.

The electronics should have been reasonably quick and easy but this was not so. My long-ago repair man had wired out of circuits the 5 push button unit. The lower button works a flat Yaxley type switch, to change from manual tuning to automatic, on the 4 top pre-tuned buttons. These have a plated, phosphor-bronze leaf contact, rather like a grasshopper's leg, which the button mechanism forces forward, to short to earth two contacts. This brings into play a separate aerial and oscillator coil for each button. Two of the leaf contacts were badly misshapen and one had at one time broken along its length. It had been poorly held back together with soft solder. To make matters worse the repair man had crudely soldered wires across the Yaxley switch contacts and where he wanted an open circuit had simply bent the contacts open rather than snipping off the wires. To disassemble the switch should have been easy and I would have expected brass rivets, but no, they were a very hard steel. Anyway, eventually, I had it apart and cleaned up with meths followed by a dip in dilute Jenolite, to really brighten up the plating. The broken contact was mended by overlapping the break with copper wire and new solder. This only works because the contact is so long, and has enough spring





Above: Original and reproduction knobs.

I am pleased with the radio and it performs quite well. Zenith promotes it as "Long Distance", on the dial, and it does live up to this despite only having the typical American simple AVC. I like the styling but others have not and said that it is ugly. Oh well! Beauty is in the eye of the beholder!

elsewhere, to ignore the heavily splinted piece. I then spent some time getting all the contacts back to the right shape before sorting the flat Yaxley type switch. After re-assembly and lubricating the mechanics came final tweaking. The unit now works very nicely but I didn't get much else done that day.

It would have been interesting to have taken one of the coils, for the press-button stations apart. However, I resisted the temptation as I reckon it's a good idea to leave 60 year old coils alone, as much as possible. I did find an article in *Wireless World*, Feb 16th 1939 on a "Ganged Permeability Tuner". The company, Wright and Weare, were not claiming anything new here, admitting that the Americans had evolved this before them. The design they described almost exactly matched up with what I could see on the Zenith.

The brass screws, for station setting, move iron dust cores inside the paxolin coil former. The one screw moves a core for the antenna winding and another for that of the oscillator. Because of the requirement to keep the oscillator frequency higher by the IF than that for the signal, cores of different permeability are used. Apparently it is also possible to get a correct result, by the oscillator coil having a different form factor and use cores of the same permeability. I take it that by form factor it means the coil will be thinner but higher. It is not possible to make one coil and core arrangement tune the whole of a band. Thus on the W and W design 3 buttons covered the MW band. For an example a tuning ratio of 1.57 was quoted giving tuning from 1500 Kc/s to 953 K c/s, which would be around half the Broadcast band on the Zenith. Sensitivity is less with pushbutton tuning because of the lower efficiency of the coils. In America, at the time, this would not have mattered at all because push buttons were used for tuning in strong local stations, this form of tuning was popular because of the proliferation of such stations around every city and town of any size.

The circuit of the 5-R-312 was mainly conventional, it was a 5 valve superhet. The only part which I studied and have shown here, in the diagrams, was the way the radio operates in manual tune and auto modes. In Fig.1 is shown the manual tune case. Note how there is a separate "tank coil", Coil 2, which tunes with the shaped oscillator tuning gang. Two windings on Coil 3 simply operate as a transformer between the 6A8G oscillator anode and grid. In Fig. 2, the auto tune case, the antenna is capacity coupled, via C2. The particular antenna coil is tuned by the common auto trimmer. Coil 2 is no longer in use and a third winding on Coil 3 is

brought into play. This is in series with the particular oscillator coil on the switched coil pack, and the two are tuned by C6. The former 2 coils of coil 3 operate as a transformer as before. The switching between the manual and auto conditions is accomplished by the flat Yaxley type switch on the lower push button.

From here, I put new capacitors inside the old cardboard cases. So thoughtful of Zenith to make removing the old 'innards' so easy. The electrolytics were replaced with new axial items, by Sprague, obtained from AES (Antique Electronic Supply) in Arizona, USA. I just sent them an order via e-mail, and a week later they were on my doorstep. They are now the only place I know for new low value (8 & 16 micro-F), high voltage, axial, electrolytics with good ripple current ratings. There were a few other things to sort out, as there were missing resistors used for bias and also additional components not shown on my issue of the schematic. For the speaker, I found that Farnell have some excellent units intended for cars. These are still 4 ohms, available in 4, 4.5 and 5 inch sizes, and inexpensive ranging from about £9 to £11. I needed to add a 2.2K 7W resistor to act as a dummy field coil. I had one of those ceramic rectangular devices in the 'stores' and super-glued it to the chassis, before wiring it to an added couple of insulated terminals. Gluing the resistor to the chassis really does help to dissipate the heat and the local area, on the outside, warms up quite appreciably. I needed to make a new baffle board to replace the disintegrating cardboard original. When I find a good thing, I push it for all its worth. So I cut this from another sheet of the perforated metal and covered it, on both sides, with a layer of glass cloth and resin. All it needed then was sanding down and finishing with black paint. When I had found replacements for a couple of the 'tubes' which tested bad, then the radio worked from first powering up. Alignment was very simple as the oscillator uses a shaped tuning gang.

Ah! but what of the missing pushbuttons and the knob with the chip out of its skirt? For both of these I used Plas-T-Pair from AES. This is a two-part (powder and resin) product that once mixed can be poured or left to slightly harden and then moulded. It is an extremely versatile material that is simply wonderful for plastic repairs or indeed moulding small items. Its natural colour is a translucent ivory, a very close match to the knobs on this radio. The knob skirt was quickly repaired and once set was ground and polished with tools in the mini drill and is almost invisible.



Fig. 1: Zenith 5-R-312
Manual Tune. Switching
omitted for clarity.

Fig. 2: Zenith 5-R-312
Auto Tune. Switching omitted
for clarity.

For the pushbuttons I needed a mould. I tried David's Isopon smooth paste. This made a mould with a very fine surface. Whilst I was able to pull out a greased good knob from it quite easily, I found it difficult to extricate the knob made from P-T-P. In trying to break apart the Isopon I also broke the new knob. My next attempt was to make a mould using Tetrior, which is similar to Polyfiller. This produced a knob (I was able to easily break the mould away from it) with not such a good surface finish and so it took a while, with fine #400 paper, sanding it down by rotating it in my fingers. P-T-P easily polishes, using a paste metal polish, to a good shine. The next knob was made in the same way but I took longer tamping and compressing the Tetrior, in an old bottle top, before inserting a good knob. This paid dividends, by eliminating more air bubbles, and the surface of this knob was indeed better. I have taken a picture of the completed knob set, but it may not reproduce too well in print, to show that the results are quite good. They actually look better and more alike in the radio as half of the knob is hidden inside anyway and because the translucent reproduction ones take up some of the colour from the cabinet. Of course if anyone has a couple of originals they would like to trade... If I were to make a more complex knob, at some time in the future, I would search for a better mould material. Tetrior does not reproduce fine detail sufficiently well. I'm sure that the P-T-P would, because this is poured into the mould as a creamy liquid. For these buttons I was able to sand the outside surface and use the mini-drill with appropriate tools, to clean and shape up the knob front, which has a rebated domed front. Also, after cleaning off all polish I filled any small pits with super-glue which dries hard and polishes to be almost invisible.

The back of the radio was made from a piece of stiff artist's board from a craft shop. After cutting to size, using a fine scroll saw, the ventilation holes were punched through using a metal punch set. Punching the fixing holes, near to the edge, does tend to delaminate the cardboard but this is easily fixed by dipping the area in a little resin with hardener and compressing this until the mixture sets. Then I spray painted it satin black and added some labels, printed on brown paper, made up using a computer drawing package.

I am pleased with the radio and it performs quite well. Zenith promotes it as "Long Distance", on the dial, and it does live up to this despite only having the typical American simple AVC. I like the styling but others have not and said that it is ugly. Oh well! Beauty is in the eye of the beholder!

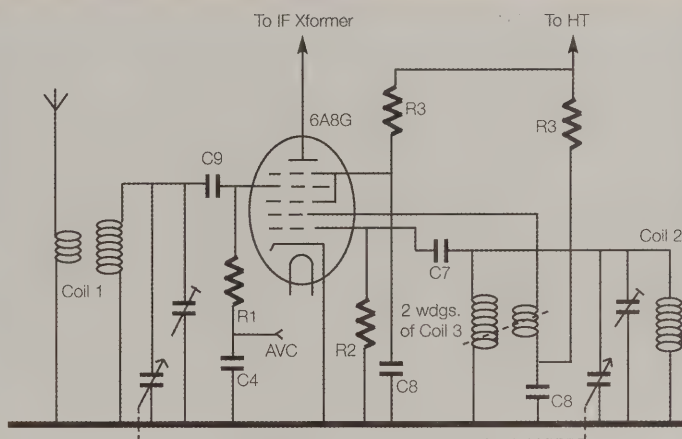


Fig. 1

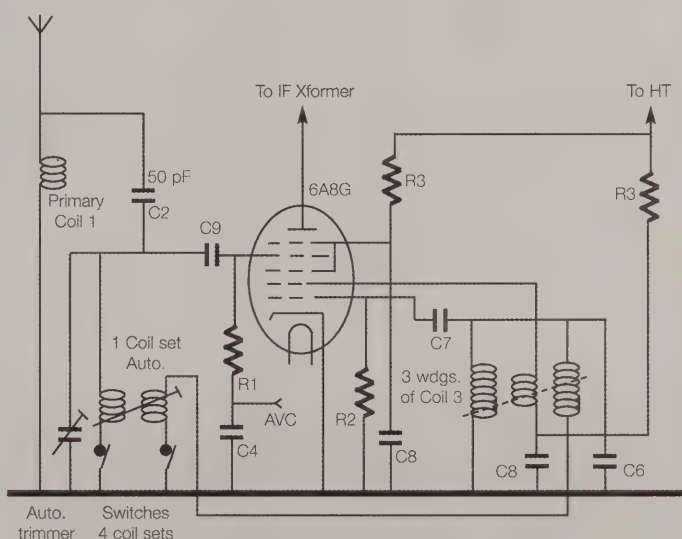


Fig. 2

Radio Reps

by Bill Smith



Strangely enough, he had no interest in collecting old valve radios but, this being the sixties, they understandably had yet to become desirable possessions.

As service manager, attending to the representatives of the firms with which we had business dealings was my responsibility. I must confess that it was not a chore that I particularly liked as it took me away from work on my bench... Work that seemed to increase daily, and which I could ill afford to neglect. However most of the reps. were highly affable fellows and some, like Campbell, although extremely talkative, were quite amusing and informative. Campbell was a small neatly turned out Glaswegian who regularly appeared in his smart coat and trilby hat and always wore a collar and tie. As I have already stated he spoke incessantly and to be honest it was a relief to give him an order and send him on his way. Actually his wife had recently died and he was obviously lost and rather lonely. As chance would have it he mentioned that he was lodging in a Hotel just opposite the flat in which I lived. I asked him over for the evening but he insisted that I join him in the hotel lounge for a drink in the evening. As you can imagine, the thought of a quiet drink and a chat appealed to me and I accepted his invitation. Campbell admitted that he wasn't a drinker and we settled down; he with his Sweetheart stout and I with my pint of lager. It was then that the horrible thought struck me that I might be the target for a diatribe on the relative merits of Glasgow Rangers and Celtic football teams, or perhaps a discussion on the downturn of shipbuilding on the Clyde. As it turned out Campbell had other interests, which were more to my liking, as his passion was for steam trains and collecting antiques. Soon I was trying hard to keep up with Campbell's chatter and to visualise the wheel order of 4-4-0, 4-6-0, 2-6-0 railway engines and such like.

Campbell had been a rep. for most of his working life and before the car had become the norm he had done most of his 'travelling' by train (remember how company reps used to be referred to as Commercial Travellers?). This was probably why he took such a great interest in railways. But it was his obsession with antiques that interested me most, as he really knew what he was on about and I must confess to learning a thing or two by listening to his anecdotes. As I said previously, I was agreeably surprised with Campbell's company, especially when he refused to let me buy! "Expenses"... he explained! Strangely enough, he had no interest in collecting old valve radios but, this being the sixties, they understandably had yet to become desirable possessions. What he did collect though were signal generators and other bench equipment, which had become redundant due to the higher frequencies

required for the developing TV trade. He actually had them given to him for free. What he did with them is anyone's guess but I suppose that he didn't like to see them being thrown away.

I spent many a pleasant evening on Campbell's visits over the years and I confess that I missed the old fellow's visits after he retired.

In those days before colour, the black and white CRT's were re-activated, boosted, or replaced on a regular basis, and I recall that many budding entrepreneurs purchased equipment to enable them to re-gun and re-vacuum CRT's, which would have otherwise have been discarded.

One such was Fred, owner of the 'Caley' CRT Company, who was a stocky, pugnacious character, immediately recognisable by his badly bashed-in nose. Fred had spent some time in the Navy and delighted in telling stories of his prowess in the boxing ring and how he had become welter weight champion in the sport. He always turned up wearing a khaki overall coat, which was extremely dirty due to the graphite from the re-furbished tubes. To make matters worse he had managed to lose most of the buttons and it flapped unglamorously around his rotund frame! We in the workshop also wore those coats to protect our clothes, however ours were of the grey, nylon variety. Sam, my radio man, whom I have already made mention of, was an inveterate smoker and his coat was riddled with holes due to the attentions of his soldering iron and his fags dropping from his mouth. Those coats were very much 'of their time', as I don't think that they are worn anymore now.

But back to Fred of the 'Caley' tubes, which I must admit to being excellent value! As I said his favourite subject was boxing and he became a bit of a pain and rather wearied us with his stories. The one he regularly trotted out was when he became the innocent victim of a bar room brawl and had acquitted himself rather well. He always embellished the tale of how he had got the better of the other fellow with the words "God knows I didn't mean to hurt him!" Nothing wrong with the phrase I know, but as it was 'whined' from his flattened nose it gained an added ambience, and indeed became one of our sayings for a spell. Dave our engineer, who did the 'Country' round, could imitate Fred to perfection and caught us out on many occasions. Dave, who was a keen sportsman, always fancied himself as a bit of a footballer and I recall a trick being played on him by one of the apprentices. It happened at the time when we had moved our workshop to new premises and one of the

young lads had noticed a loose knot on one of the wooden floorboards. Inserting a piece of wood (part of a broom handle in fact!) into the hole where the knot had been, he thoughtfully placed an upturned cardboard box over it. Dave, who had completed his country calls, breezed in later and on espying the upturned box, advanced on it with a whoop with the intention of dispatching it to the other end of the workshop. As he made contact with the piece of wood concealed inside the box the scene was reminiscent of a 'Tom and Jerry' cartoon whereby with a 'Dyoing!' Tom is seen to oscillate like mad! Dave was certainly stopped dead in his tracks but after hopping around and screaming vengeance for a spell, he sportingly admitted to seeing the funny side of things!

Most reps. were anxious to get an order and were inclined to 'butter you up'. I recall that around the Christmas period they would enquire if I had received my 'Bottle'. The gifts and bottles invariably travelled no further than the 'office' or were 'spirited' away to the house of my employer, but I suppose that was par for the course as they say.

One representative for a small firm that I had been supplying with an occasional order did personally hand me a half bottle of Whisky one Christmas but that was the one and only time I was successful in securing a 'perk'. The fact that the brand of whisky was one which I had never come across and indeed have never seen since, didn't bother me... I was just delighted with my gift.

This was around the time when transistors were making an appearance and the Japanese were producing those little personal radios, which then were considered something of a miracle of ingenuity. I was very impressed with by the ones that Geoff. (the rep.) was trying to sell, and purchased a box of them to sell on hoping to make a profit. I had a friend who made deliveries for a wholesale fruiterer and who travelled all over and he offloaded a considerable number of them for me and we did very well for a spell. As I remember the name of the radios was SECURA and sales were so good that I decided to invest in some more.

Unfortunately the ones now on offer were very inferior with noisy transistors and background hiss so I didn't purchase any more. Strangely enough I recently came across the Secura that I had given my son all those years ago and recalled that I had used the IF transformers for constructing beat frequency oscillators. The BFO's were always extremely 'fiddly' to tune in and even when I recently bought a top of the range Sony 2001D I found that it was still difficult to resolve and understand those 'Donald Duck' voices being broadcast on the side bands.

The orders given to Geoff were mostly for valves which, I think were either of eastern European or Chinese manufacture, and were coded in such a way that it was possible to tell by the month and year if they were under guarantee. The code was a simple one involving twelve different letters, one for each month, followed by the year. To remember the sequence the retailer was furnished with a cunning line of poetry, which went: - THE LAZY DOG IS. So that in the case of the month being January and the year being say 1973 the markings on the valve would be T73... the letter S would be December of course!

The name of the valves supplied escapes me at the moment but I remember that the boxes were red and navy blue in colour. In an effort to jog my memory I checked my stock of valves, without success I may say. I did find though that I had forgotten how many different valve manufacturers were around at the period. Apart from the main Mullard, Mazda, Marconi, Osram, Cossor, and Brimar there were upwards of a dozen or so different brand names. I have quite a variety of boxed valves and the following names may bring back memories to some of you older readers. SOLUS, ELPICO, DARIO, TUNGSRAM, TRONNIX, PINNACLE, RCA, HRS, TTR, EDICRON, and ZAEROX. Those

manufactured by SOLUS displayed a somewhat similar code as the ones mentioned but the boxes in this case were pale blue in colour and the name SOLUS didn't ring a bell with me!

STOP PRESS! While engaged in tidying up my workshop I came across a neatly packed carton of television valves 'Brand New and Boxed' as they used to advertise! Due to the demise of valve technology these items became very much redundant but at the time I didn't have the heart (almost said 'bottle!') to throw them out. On opening the box I was amazed to find two of the elusive, aforementioned valves reclining on the top layer! As I said before, the boxes were navy blue and red in colour and the bottom third was in contrasting squares. The top part of the box had the name ELECTRON VALVE in red with the words 'Fully Guaranteed' underneath. Below that in the contrasting squares area the words STANDARD BRAND were displayed. On further inspection I found that the valves were coded GDX2 and SDC2 respectively.

Obviously the code was more extensive than I had presumed and I can only conjecture that the middle two letters completed the parts of the year... perhaps I should invest in an 'Enigma' machine! I thought that I had it all worked out but considering the gap in time and the fact that I am now in my dotage I hope I may be excused!

Bob, the Radiospares representative, was young and new to the job and absolutely full of his own importance. He had given up his apprenticeship in the radio trade to further his career prospects with Messrs Radiospares, and as it turned out it proved to have been the right decision. Indeed he was very successful at his job and later became responsible for the whole of the northern Scottish area. He couldn't have been there at a better time as Radiospares was pre-eminent in the trade and no other firm could match them in supplying component parts. They seem to have been able to supply every possible replacement part for most sets and when I think back to all those Philips Mains droppers, dual controls, dropper sections, and all the bits and bobs we had to replace, I don't know how we in the trade would have managed without Messrs Radiospares.

As I said, Bob was a bit of a know-all and the most irritating and annoying thing about him was that he was usually right! I recall that during the mid-sixties I landed up in hospital with a 'Spontaneous pneumothorax' (punctured lung!) and my return to work coincided with Bob's visit. While I was telling Bob of my experience he interrupted with "Do you smoke?" I answered in the affirmative only to be further asked, "Do you use carbon tetrachloride?" "What on earth has that got to do with my punctured lung", I enquired? "Well!" exclaimed Bob, "If you use CTC whilst smoking, you manufacture Phosgene gas which goes for your lungs". I confess that I had never heard of this before but must admit to it being a plausible concept. "Wait a minute though Bob" I said "I only use Radiospares switch cleaning fluid and it doesn't contain CTC!" "Don't you believe it!" said Bob, "It is one hundred percent CTC!" I thought that I had got the better of Bob for once and fetched a can of the fluid and proceeded to read the warning on the label. It read, "Beware of other products containing Carbon Tetrachloride". "Well!" I enquired of Bob, "Satisfied?" Bob took the can from me and calmly read the words out loud this time putting emphasis on the word OTHER. It made perfect sense... Bob was right once more. On looking back I think that my experience with CTC had not been an isolated incident... Bob certainly seemed to know all about it! If it had happened during the present time, I daresay that there could have been a case for suing someone for my five weeks spent in hospital! However not to worry... I'm still very much alive and kicking, although I must admit that I have long given up the smoking habit!

Most reps. were anxious to get an order and were inclined to 'butter you up'. I recall that around about the Christmas period they would enquire if I had received my 'Bottle'. The gifts and bottles invariably travelled no further than the 'office' or were 'spirited' away to the house of my employer, but I suppose that was par for the course as they say.

A Golden ST300

by Peter Kyne

I have been a member of the BVWS for only about four years. So I was most flattered when Gerry Wells invited me to bring my new ST300 over to the Vintage Wireless Museum at Dulwich for him to cast his expert eye over it.

When I say “new” I had best clarify that I do mean new. My own “thing” is recreating, from scratch, home construction sets from the late 20s and 30s. This particular set was designed by John Scott-Taggart, the constructional details being published in the February 1932 issue of “The Wireless Constructor”.

Gerry was aware of my set as I’d shown him a photo of the finished result at one of the Harpenden get-togethers. He had rebuilt an original ST300 some time back and knew there were one or two points, which needed to be got right if the set is to perform well and be free of HF instability.

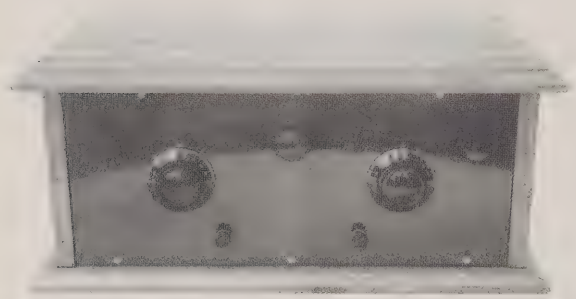


Figure 1 (top right): Gerry Wells and myself with my new ST300 at the Vintage Wireless Museum in Dulwich.

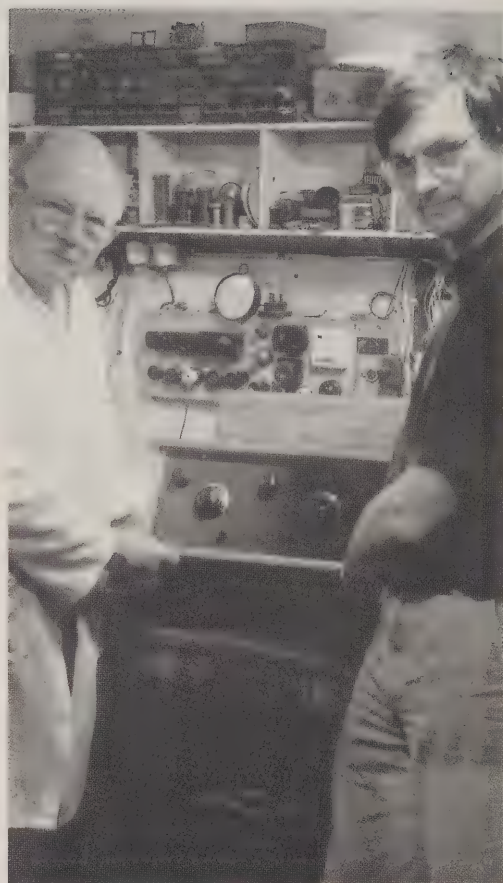
Figure 2 (above): The completed ST300 in its cabinet.

The Visit

It was a couple of months before I got round to fulfilling the invitation and Gerry and his cohort were most welcoming. After a certain amount of tea and chit-chat (this is the best part of the “Dulwich Experience”) we finally installed the receiver in the workshop for testing. In common with most receivers of this period this set requires HT & grid bias batteries and a 2 volt LT accumulator. However as I can’t be bothered to maintain such things the set is provided with its own dedicated eliminator (more about this later).

The Museum has “special reception conditions” which are particularly challenging to the selectivity of a receiver. These come in the form of an unreasonably powerful Country & Western station within spitting distance of the street door (what would have been politely referred to as a “strong local” in the early 30s).

My anxiety as to how well my ST300 would stand up to this RF onslaught was unwarranted and adjacent stations were brought in clear of any breakthrough. The foreigners rolled in without difficulty and at this point my enthusiasm got the better of me as I moved towards the dials offering that “It brings in the World Service quite well”. Whilst I was tuning around the appropriate point on the dials Gerry tried to cushion potential disappointment with the warning that the World Service doesn’t come in too strongly in West Dulwich. Sure enough all I could raise was some station churning out pop music. The look of resignation on my face was accompanied by consoling sounds from Gerry. Then, spontaneous laughter, as the music ended and a formal English accent announced “This is the World Service”.



Gerry’s final verdict on the set was “I cannot fault it”. Praise indeed, I was heartened to the point of embarrassment.

All in all, my visit to the Museum was most enjoyable. I am very grateful to Gerry for his time, interest and words of advice & encouragement.

An apology

Before we go any further I feel I should say the following in mitigation. It’s always difficult when writing for an audience which contains readers with a vast experience of the subject. You are fearful that you will insult their intelligence by reiterating the obvious. On the other hand if you don’t include sufficient detail the piece becomes a bland statement with no possibility of engaging those who have a practical or technical interest but less experience. So I apologise in advance for boring the reader with unnecessary detail or frustrating them due to lack of it. “You can please some of the readers some of the time” etc etc.

Why Build Replicas?

A good question, I suppose it’s because I enjoy it but that’s too glib an answer. Also I’m interested in the history, both technical and social, that contributed to the phenomenal rise in popularity of domestic wireless in that Golden Era.

Despite the deepening recession the population of the time was caught up in the excitement of wireless. People with no technical knowledge were prepared to invest a considerable sum of money (often several weeks’ wages) in the belief that they could construct a

piece of the latest technology. Not only did they believe they could build this thing, of which they had little or no understanding, they also hoped it would actually work and bring the world into their homes.

As a result of my interest in this subject I have over the last few years built up a small collection of books, magazines and technical literature relating to home construction. It is often the magazines that I find most illuminating about the social values, attitudes and forces, which influenced the home construction movement.

For me, constructing and using these receivers is an essential part of understanding what it was all about. Recreating these sets forces you to obtain, understand and restore the component parts. When you can't get parts or they are beyond repair you have to find ways of making them. Building the sets allows you (to some extent) to understand the home constructor's experience. Using them, as a normal domestic receiver, gives insight into their peculiarities, foibles, limitations and charm. It also lets you feel the added satisfaction, that must also have been felt by those domestic pioneers, of bringing the world to your home through something you have made with your own hands.

However there is of course a danger when trying to explain why you do something, which is frankly quite potty, that you will simply try to justify it with rational argument. What motivates us is not logic but how we feel and to me it feels like this. It's like seeing a picture and wanting to own it but buying it is not enough, you want to paint it.

On the Subject of Fakes

At this juncture I feel I should address a point which may be looming in the mind of the reader. Are these sets fakes? The answer to this question is a resounding NO! Like most members I have strong feelings about fakery.

A fake is identifiable in two ways:

- 1 the *intention* of the Faker is to deceive others for personal benefit, either to gain undeserved status as the owner of a prized set or to gain financial benefit through criminal deception
- 2 the *appearance* of the set is such that it looks like the genuine thing although some of the parts or materials are wrong.

Building a replica set involves hundreds of hours of painstaking work. After having put all that time and effort into a set one would have to be daft to credit the work to some other chap 70 years ago. I'm happy to claim the sets I have made as all my own work. I wouldn't consider selling them as they are worth more to me than anyone would be prepared to pay for them.

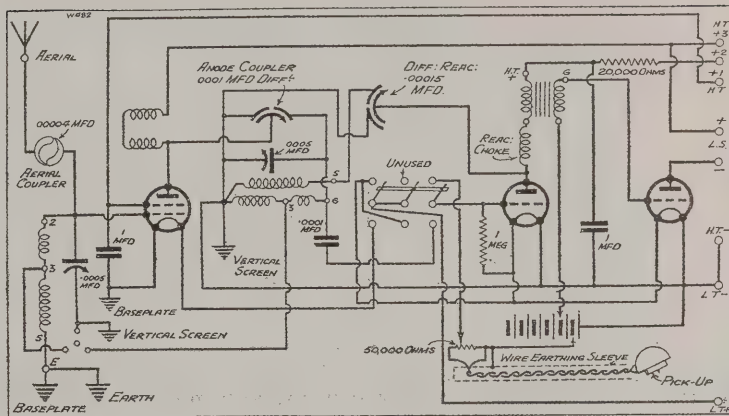
On the second point, a replica set has to be technically accurate if its performance is to represent that which the designer originally produced. This means inevitably that due to availability, substitute materials have to be used, which have the correct technical specification but are clearly not vintage. When a replica set is completed it is new and it looks new. No one would be fooled into thinking it was 70 years old.

Why was I interested in this set?

My initial interest was raised when I picked up a couple of copies of "The Wireless Constructor" at a swapmeet. Firstly it was the authors promotion of his latest wonder that got my attention; it wasn't that I was taken in by his hype, what fascinated me was that it was so over the top. Secondly the circuit was basically a standard three-valver with baseboard construction (SG, Det & LF); however, it did have a few oddities of the sort which turned out to be characteristic of the designer. Lastly the set itself had a certain well-ordered visual appeal.

Research

Research can be divided into two areas. There's technical research, the purpose of which is to enable you to build a fairly accurate replica of what the designer



Readers will immediately recognise the similarity of the circuit to that of the famous three-valve "S.T. 300" set. The difference lies in the special control switch which, besides changing from radio to gram, switches the receiver on and off. The H.F. valve is automatically cut out of circuit when records are being played.

intended and there's social research, which enables you to achieve some understanding of the background and personalities involved. In practice the latter tends to come as a by-product of the former.

Most of my research simply consists of reading as much material as I can, relevant to the project in hand. Other BVWS members are also of course a valuable source and even if they do not totally trust their memories they can give you a valuable steer on where to look for the information.

John Scott-Taggart, the designer of this set, was possibly not the world's best, but if you build his sets as specified they do work. There is a sense of "getting a silk purse out of a sow's ear" although perversely when you tot up the cost of the parts they were not cheap. John Scott-Taggart was really more of a showman than anything else, a blatant self-publicist who would hype his latest design to the point of incredulity. However if you followed his instructions his sets would do what he claimed.

There is a very good but unfortunately short article, about this designer, by Geoffrey Dixon-Nuttall. It can be found in the BVWS Bulletin, volume 23 number 2. In his reflections Geoffrey is not particularly flattering, however he does concede that "He (John Scott-Taggart) probably gave much innocent pleasure to a lot of ordinary people".

The feature for which ST's designs are probably best known is the over-sufficiency of knobs on the front panel. As time went on this apparently became even more so. The ST300 has 7 controls and they all do something. Its successor the ST400 had 9 controls (nine!), in addition there was a pre-set "automatic reaction equaliser" control mounted on the baseboard.

The appearance of the ST300 is very ordered, both on the inside and out. From the front its most obvious feature is the symmetry of the controls mounted on the Ebonite panel (apart from the fact that the knobs on the extreme left and right do not match, due to the specified controls being from different manufacturers).

The coils are unscreened, necessitating a vertical aluminium screen between the HF and reacting detector stages. Just for good measure the floor of the HF stage is covered with copper foil. The designer's layout is very tidy with the interconnections between components being by straight rigid wires and a solid looking terminal strip provides for all external connections.

The whole is housed in an "American Style" cabinet (sometimes referred to by the English as a tabletop cabinet). This type of cabinet has the advantage that when the muse takes you, by lifting the hinged lid you can view the most interesting part of the set – the inside.

The circuit is based on a standard three-valve using a non variable- μ screen-grid valve as a HF amplifier, this is followed by a reacting grid leak detector, which is

Figure 3 (above): This is the theoretical circuit diagram, as it appeared in the September 1932 issue of "The Wireless Constructor". In fact it's the "Exhibition Radio-Gram" version of the set (produced for the Radio Exhibition at Olympia) and as the text indicates, the only difference between this and the original set is in the switching arrangement for the pick-up.

The whole is housed in an “American Style” cabinet (sometimes referred to by the English as a tabletop cabinet). This type of cabinet has the advantage that when the muse takes you, by lifting the hinged lid you can view the most interesting part of the set – the inside.

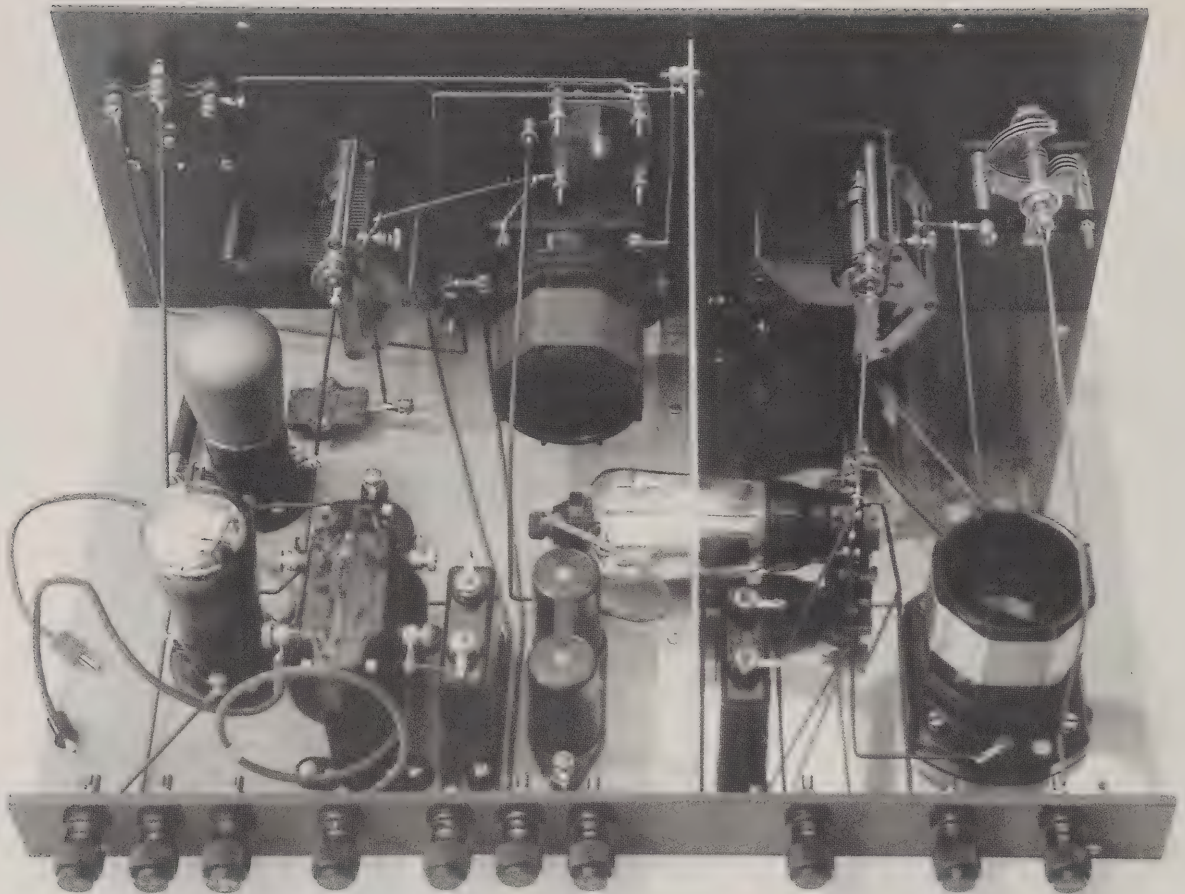


Figure 4 (above): The completed ST300 without its clothes on.

transformer coupled to a triode LF output valve. However there are certain features that differentiate this design from others.

The dual-range tuning coils are very simple. They are wound on standard 2 1/2 -inch air-cored Bakelite formers. The aerial coil consists of just two windings: the medium wave winding is a single layer solenoid of enamelled wire, the long wave winding being DSC wound in two slots. There are no tappings or coupling windings. The "anode coil" (which is actually connected as a tuned grid circuit in the detector stage) is the same, with the addition of a single reaction winding, wound in a slot between the other two windings. Mr Scott-Taggart maintained that these coils were "completely different" on the basis that the windings were connected to different terminals on their respective formers.

Due to the lack of tappings or any aerial coupling winding the aerial is connected to the hot end of the first tuned circuit. ST's solution to maintaining selectivity was to couple the aerial via a very low capacity air-spaced variable condenser with a maximum value of 40 pF (its minimum value being about 4 pF). This component is mounted on the front panel as a means of adjusting selectivity.

The HT is fed to the SG valve's anode via a good quality HF binocular choke. HF signals are coupled from the SG anode to the second tuned circuit by a solid dielectric differential condenser with a value of 100 + 100pF. This variable control which is styled the "Anode Coupler" is also mounted on the front panel as a further means of "adjusting selectivity". In action it is an attenuator for the HF signals fed to the detector and when operated will clearly have a de-tuning effect on the associated tuned circuit. Depending on the setting of this control the impedance presented to the tuned circuit in the detector stage affects the damping and therefore its bandwidth.

Although I have put my reflections on interest and research under separate headings in practice there is no clear dividing line between them, each one feeds the other. However somewhere along this line comes the realisation that you have committed yourself to building this thing. One motive, which seems to apply in all such cases, is that of wanting to know just how well it would have worked when new. The only way to find out is to get a new one.

Of course there are limitations to answering this curiosity, as modern reception conditions are different from those that prevailed in the early 1930s. Transmitters are more powerful, the frequency discipline of stations is almost total, there are very few pirates on the AM broadcast bands and not withstanding the rubbish radiated by colour televisions & computers, interference is less of a problem. However it's still fun to try to find out.

Collecting bits

This of course refers to collecting together the parts and materials needed to construct the set. Back in the early 30s this would have been a simple, albeit fairly expensive, business. There was a complete infrastructure in place, geared up to get this stuff into your hands – for a price. If you wanted to, you could have the whole lot delivered to your door in one box, and many did.

These days it's a little more challenging. Therefore it's a good idea to have a clear picture of what you are aiming to achieve before you start expending time and energy on the venture. For me the goal is to recreate what the designer originally produced – warts and all!

One needs to be self-disciplined about this otherwise you can end up deviating from the original spec either from lack of attention to detail or worse still from a desire to improve on the original design. If this happens you still end up with a set that works but from my point of view it

invalidates the achievement.

To keep on track I try to stick to the following principles:

Try to maintain dimensional and technical accuracy because layout, dimensions and the value & quality of the components used can affect the final performance of the set. Also if it doesn't look like what the designer specified then it's not the same set. I think I need to justify this last point. There were many designs but few circuits. Given the technology of the time there were a limited number of circuit configurations that would work well. The result of this was that various designers would dish up virtually the same circuits with different layouts and cabinets and insist that each was a new and original design. Therefore the overall appearance, both inside and out, was essential to identify it as that particular set. The same applies to cars, houses, coffee pots etc.

Try to be as authentic as is practically possible i.e. use the components specified (manufacturer, type, value) and keep the materials as close to the original as is achievable (within my limited resources).

I started on my ST300 by drafting a detailed shopping list. This began with the parts list provided by the designer and I then added any other requisites. As most of the materials and consumables had to be modern substitutes I listed these separately from the components.

A visit to my "spares box" revealed that I already had the valves and most of the parts needed. This is not so surprising as I make a habit of keeping an eye out for parts, which I know I will need for future wireless projects. These accumulate in my spares box ready for the time when they will be used. Those parts which I did not have, I was able to obtain with the kind help of other BWWS members.

Unsurprisingly I was not able to lay my hands on the right cabinet and so, as with past projects, I knew I would have to make this from scratch, along with the baseboard, front panel and terminal strip. My materials/consumables shopping list included:

- wood for cabinet and baseboard
- spirit based wood stain
- button polish (aka French polish or shellac)
- aluminium and copper sheet for screening
- a selection of brass woodscrews
- a suitable substitute for ebonite for the front panel and terminal strip (more about this later)

Restoration

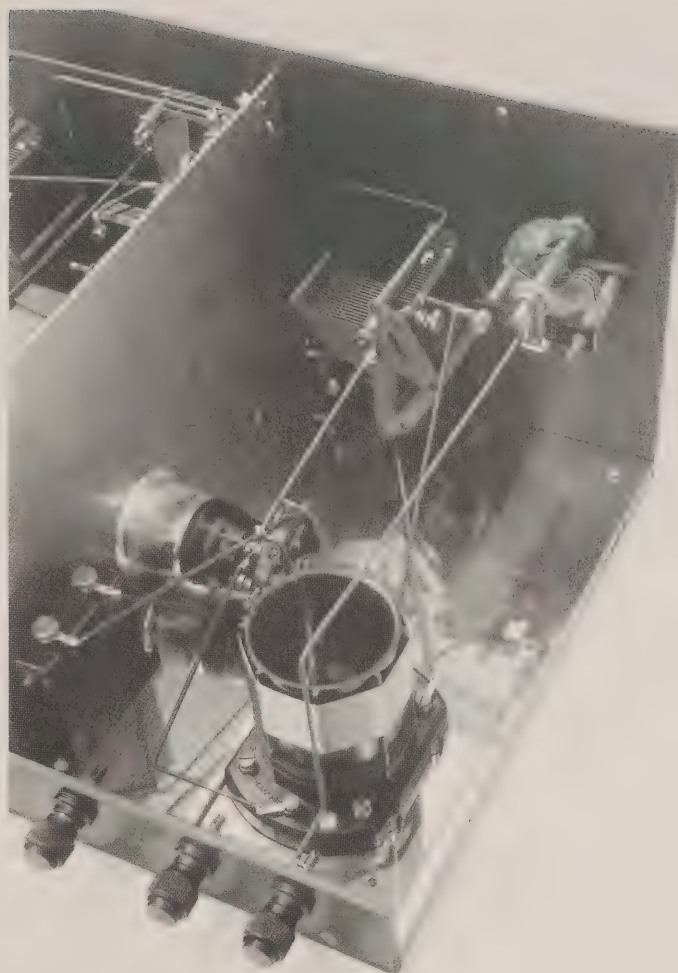
I do not intend here to give a full treatise on component restoration. Given the anticipated readership this would be an extreme case of teaching one's grandmother to suck eggs (although under what circumstances this unfortunate woman gained such unquestioned expertise, in this field of endeavour, I shudder to think). However, I will take the opportunity to relate those points which I think may be of interest to some readers.

Tuning coils

The first components I tackled were the tuning coils. Strictly speaking this was not so much a restoration as an adaptation. I did not have a pair of ST300 coils, however I did have an ST400 anode coil (made by Colvern). Its identity was certain, as it still bore the manufacturer's label stuck to the inside of the former, identifying it as such.

The ST400 was developed from the ST300 and the anode coils were identical. As this coil was in good condition all that was required was some dusting and careful cleaning of the Bakelite former with some damp cotton buds. The terminals were polished to remove tarnish, ensuring good electrical contact and improving their appearance.

The challenge here was the aerial coil. I had been on the outlook for one of these for some time with no luck, therefore there was nothing for it but to make one. I had no actual data on the coils save for the circuit diagram, photographs of the receiver and a baseboard layout diagram. This and a certain amount of logic told me that



the two coils should be identical save for the reaction winding and the terminal connections.

I measured the inductance and physical dimensions of the MW and LW windings on the anode coil and Wheeler's formula gave me a close approximation of the number of turns required. In the case of the MW solenoid winding, this also allowed me to work out that it was 26 swg (enamelled). For the LW winding visual examination and common sense told me it would be 36 swg DSC (green).

I had a Colvern coil on a matching former, which was not one of a set and with windings in poor/mediocre condition, I decided to recycle this. I carefully unwound the wire onto cardboard tubes for storage and gave the Bakelite former a good bath in hot water and Fairy Liquid. It was then rinsed, dried and left in a warm place till bone dry. It needed just one extra hole to accommodate the new MW winding which was made with a 1/16 inch twist drill.

My plan was to re-use the old LW winding, however the silk was snagged due to abuse and the wire was showing bare copper in over a dozen places. This damage was mostly at one end of the wire, which had been on the outside of the original pile winding. To restore its electrical integrity I unwound the wire and touched in these bare patches with clear cellulose lacquer, which dried almost instantly.

My home made coil winding machine (made from a 10 inch coachbolt and composed mostly of 1/2 inch plywood) was used for the rewinding. I started the LW winding with the "finish" end of the old wire so that the repairs would be covered and hidden by the section of wire with undamaged silk. By putting on too many turns I was able to unwind a turn at a time until the inductance measured the same value as the anode coil.

For the MW winding I needed 26 swg enamelled wire and having no vintage wire to suit I used modern wire. It

Figure 5 – Showing the HF section with the SG valve through the screen to the left. In the foreground is the rewound aerial coil sitting on the copper covered baseboard.

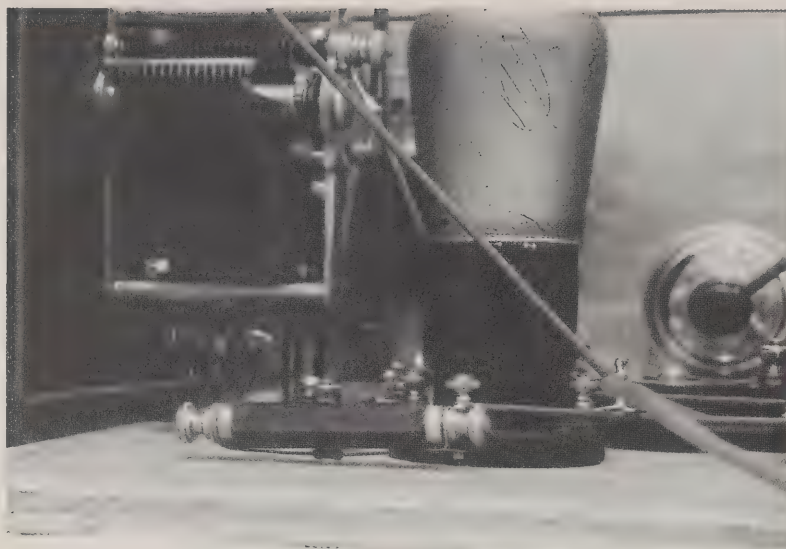


Figure 6: Here the Ohmite grid leak resistance can be seen with the real grid leak resistor hiding beneath the Ohmite's bulk. The transparent insulating washers under the Ohmite's left-hand terminal nut are almost imperceptible.

does the job just fine but of course it's not dark brown in colour. This doesn't bother me unduly as the set is a replica not a restoration of an original vintage receiver. Turns were adjusted as before to achieve the correct inductance. Both coils were then wrapped in tissue paper and stored in small cardboard boxes for later use.

Tuning condensers

Fortunately I was able to obtain a pair of tuning condensers, identical to those used by John Scott-Taggart in his set, as published in the original article. These are of solid brass with an integral slow motion drive and as is usually the case needed cleaning and adjustment. There were also some parts missing, which were replaced from an incomplete unit. Having thoroughly examined the condensers for any defects I stripped them down for cleaning. This is always slightly nerve-wracking as a mishap can result in lost parts or damage. I won't go into the boring details but suffice it to say that this operation along with lubrication, reassembly and adjustment took the best part of two days. On completion they were packed and stored in a similar manner to the coils.

LF transformer

The transformer used in the designers published set was a Varley Niclet, which I did not have at the time. However I did have a suitable Ferranti, which was the high quality option on the designer's list of alternatives. Its windings were intact and I had been saving it for a set that was sufficiently worthy.

In addition to dirt, grime and tarnish the metal casing had been scratched in the distant past and storage in damp conditions had resulted in some fairly serious rust patches. The casing was cleaned initially with a damp cloth and then using white spirit, the terminals were polished to remove tarnish.

The four fixing bolts were removed with the mounting feet and the two shells of the casing split from the transformer. The rust on the outside of the casing was quite deep and I had to resort to scraping it away with the blade of a small screwdriver. Having got down to bare metal I finished with a small pencil wire brush in a hand held electric engraver. The casing was re-cleaned and the bare metal was cleansed with meths then touched in with a single coat of "Humbrol Super Enamel" black paint using a fine artist's brush. This turned out to be an excellent match for colour and finish. These parts were then put away in a dust free atmosphere for several days to allow the paint to harden.

The fixing bolts are steel and had rusted, their special nuts are plated brass and they had tarnished. These were polished clean with a small wire wheel brush and coated

in clear cellulose lacquer, which was dry within a matter of minutes. When the enamel paint was hard enough, several days later, the transformer was reassembled and tested then wrapped up and stored away.

Grid leak

The grid leak specified for the original design was a 1 megohm Ohmite resistance, which was made by Graham Farish. These have a quite distinctive appearance with a moulded six sided body and plated terminal nuts at each end.

I was keen to use one of these and had at the time just one in my spares box. As is typical of many resistors of this period it had gone high in value and although marked 50,000Ω coincidentally, to my slight surprise, actually had a value of about 1MΩ. I did try it in the completed receiver but as I suspected it had also become very noisy, generating sufficient white noise to produce an audible hiss in the loudspeaker.

I was not confident of getting this component apart, in order to effect a refurbishment, without damaging it. The solution I adopted was to build the Ohmite resistance into the set, such that although it appeared to be in circuit it was not, its function actually being carried out by a miniature 0.6 watt metal film resistor.

To isolate the HF end of the Ohmite I punched out two insulating washers from some transparent packaging material and made an insulating bush by shrinking a short length of heatshrink sleeving to a size to suit the terminal screw thread. The metal film resistor was slung beneath the Ohmite resistance and connected in circuit by way of unobtrusive solder tags. Although well out of sight I blackened its body and leads with a spirit-based fibre tipped pen, just for good measure. The end result is quite convincing.

Push - Pull switches

I had one complete three-point switch of the correct type and manufactured a second from two incomplete switches. The terminal mount for the sliding contact was missing and I fabricated the replacement from a piece of thin brass sheet. This small bracket has a 3/8-inch hole, which is impossible to drill without destroying the workpiece. The trick is of course to drill the hole first and then cut the bracket out round it.

Mansbridge condensers

There are two required for this set, both 1 mfd with Bakelite bodies. Condensers of this type are in my experience always leaky and the ones I had were so leaky as to be virtually short circuit. I replaced their innards with modern non-electrolytic capacitors in the usual way.

All of the components needed cleaning and some restoration; most had to be dismantled to achieve this. I did not keep a record of the time spent on component restoration but it must have been in the order of 150 hours.

Spaghetti resistance

Some components cannot be restored. Spaghetti resistances are a good example of this. Even if you find one of the correct value, which is not open circuit, as soon as you start to bend it to the shape required to fit the set it starts to physically disintegrate. Of course you can use a cartridge resistance of the appropriate size; even if it's open circuit they are fairly straightforward to repair.

The ST300 uses a 20 KΩ spaghetti to decouple the detector HT feed. Substituting a cartridge resistance would not only be a deviation from the spec but it would also require a modification to the baseboard layout to accommodate it. The solution I have used in the past is to make a replica: it will not fool an expert eye but it is sufficiently in keeping to not look out of place.

For those who are interested I will explain the process. If you're not interested and haven't already fallen asleep I suggest you skip the next bit.

Some components cannot be restored. Spaghetti resistances are a good example of this. Even if you find one of the correct value, which is not open circuit, as soon as you start to bend it to the shape required to fit the set it starts to physically disintegrate.

The parts needed are:

- 9 x 2.2 K Ω miniature metal film resistors (0.125 watt)
- 2 x crimp-on eyelets with blue sleeves
- an 8 inch length of 6.4 mm heat shrink sleeving (I chose black)
- a 10 inch length of 18 swg copper wire or similar (this does not form part of the finished component, it is an aid to the manufacture).

Wrap the copper wire around a 2 inch cylindrical object to form about 1 1/4 turns. Feed the heat shrink sleeving onto it and holding one end with a pair of pliers use a heat gun to shrink the sleeving to its minimum diameter. When the whole has cooled slide the coiled sleeving off and put to one side for later use.

Form the wire ends of the resistors into fine spirals (like an open spring) by wrapping them round a dressmaker's pin. Leave one wire on two of the resistors straight, these will form the two end connections. With the aid of a pair of fine nosed pliers crimp the resistors together in a chain and solder these joints. Ensure the chain is straight and pull it out until it is 8 1/2 inches long.

Feed the chain of resistors through the length of the sleeve leaving the straight wires protruding at each end. Form a small bend at the end of each wire like an inverted 7.

Using two pairs of fine nosed pliers pull the blue sleeves off the eyelets, then split open the joint on the tube of each eyelet with a blunt knife blade and open this out to a gap of about 2 1/2 mm.

Feed the wire ends through these split tubes and solder the wire end to the eyelet in the area between the tube and the eyelet hole. Now pucker the ends of the heat shrink sleeving, feed them into the split tubes of the eyelets and crimp them closed.

I finished off the component by creating a label on a computer and fixing it round the sleeving with some PVA glue.

Making things

In addition to the work on components, the things which had to be made included the front panel, terminal strip, screens, baseboard and cabinet.

Front panel and terminal strip

New Ebonite can be obtained. It is still manufactured in America and providing you are prepared to purchase the minimum quantity (a container load) there is no problem in getting it. As this would exceed my requirements I used a substitute material. I wanted a material which would have the appropriate electrical characteristics, so the faker's standby (plywood painted black) was ruled out. Also it is rather soft and although I have used it for making panels with a stained finish I find it is in some ways difficult to work with.

The material I chose was Tufnol. Most types of Tufnol are not suitable: in the fabric-based types the substrate shows through the surface and of the paper-based ones most are too light in colour. However there is one sold under the name of Kite Brand, which is dark chocolate brown in colour with a polished finish. It is not dissimilar in appearance to polished brown Ebonite although it is harder to work. This is in the RS catalogue and can be obtained through RS's sister company Electromail.

When making a front panel or terminal strip I first cover the whole of the face side with 2-inch wide strips of masking tape; this protects the Tufnol, which picks up scratches rather easily. It also provides a good surface for marking out, for which I use a black spirit-based pen with a very fine fibre tip.

For cutting panels to size I use a hand held electric jigsaw with a fine toothed metal cutting blade. Edges are smoothed with medium then fine metalworking files. It's important to file along the length of the material otherwise chipping is likely to occur. A "Workmate" bench is useful for these operations.

For drilling I mark out as accurately as possible then gently centre punch and drill a 2 mm pilot hole for all sizes of hole (unless of course the hole is to be less than

2 mm). Then holes up to 1/2 -inch can be drilled using metal working twist drills of the appropriate size. A drill stand is a great help.

For holes larger than 1/2 -inch a series of holes are drilled. Still larger holes (e.g. for meters) can be cut out with a jigsaw. In both cases the hole is finished to size with a half round file. Countersinking is done with a normal fluted bit.

Screens

The ST300 has one vertical aluminium screen and a sheet of copper foil covering to the baseboard in the HF section.

I already had an old piece of aluminium with a right angle bend, so I cut this down to the correct size with the jigsaw, leaving the remainder for another project. The position for the screen grid valve to pass through was marked out with a pair of compasses and the hole was made by drilling a series of small holes then finished with a half round file.

All marking out for cutting and drilling was done with the ubiquitous fibre tipped pen straight onto the metal, this was removed later with meths. Normal metal working techniques were used and all edges finally finished by draw filing with a fine file.

I did not have any copper foil and so used some thin copper sheet (about 18 thou' thick) to cover the baseboard. This had the disadvantage that the screw holes could not be pierced through but had to be accurately drilled. The advantage was that the end result was not wrinkled, as is usually the case with thin foil.

Within about a week of finishing the set all my fingerprints had "developed" quite nicely on the surface of the copper - most unsightly. So I removed the set from its cabinet and managed to withdraw the copper sheet leaving all the components still in place and still attached to their connecting wires. The problem was solved with metal polish and the finish maintained with some clear cellulose lacquer. It was of course necessary before applying the lacquer to mask-off the areas where electrical contact had to be made.

The baseboard

Was cut from normal 1/2 inch plywood. The only point to watch is that the front edge must be square otherwise when the front panel is screwed in place it will not be upright.

The cabinet

Previously I have made cabinets from thick plywood, using hardwood edging and mouldings to disguise the laminations, which would otherwise show on the edges.

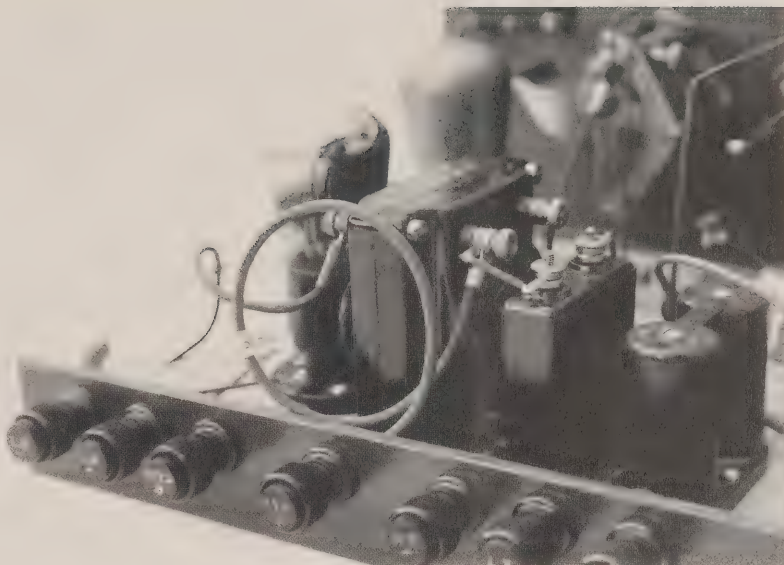


Figure 7: In the foreground is my home-made Spaghetti resistance with one end connected to a terminal on the restored Ferranti LF transformer. Note the home-made label attached to the Spaghetti.

New Ebonite can be obtained. It is still manufactured in America and providing you are prepared to purchase the minimum quantity (a container load) there is no problem in getting it.

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An honourable obsession?

A surgeon looks at TV servicing in the 1960's

by David East

With most obsessions you can date precisely the point when you get hooked...

Mine was in an Edgbaston loft in 1964. Staying with a Cambridge friend who built high-gain physiological amplifiers in his spare time (he still does the same sort of thing – rats with six-pin connectors) I spotted an old TV.

"What's that for?" I asked.

"Oh, that's just the 'scope for my electro-physiological project" he said.

"Look, if you just switch the frame timebase off for a minute you get a line and you can feed the signal into the frame and the thing moves up and down. Or, you can just watch the telly".

This was a remarkable discovery, because although I'd built crystal sets and 6V6-based valve amps, I'd never been tempted to have a go at television. I suppose I never realised that you actually could.

Then I started to acquire a set or two. An early purchase was a Bush TV36C. I got the data from the Shropshire Reference Library and set about reviving it. It had a particularly linear timebase, I recall, and you could easily achieve a perfect circle on the Test Card. At the same time I got hooked on the music. In later years I came to understand better the quality of the musical accompaniment by joining the Test Card Circle, and

now know that I'd been listening to the 'High Stepper' tape. Last heard that in 1966 or thereabouts, listened to the tape at a TCC meeting over 30 years later – and I still remembered what tune followed what! The BBC signal from Sutton Coldfield was excellent, but I had a problem with Band III from Lichfield. My parents, like many of their generation, felt that some things were 'vulgar'. At the time that included automatic washing machines, foreign holidays and of course the 'commercial channel'. So I built a large Yagi array out of coat hangers and bits of wood. I was then able to get a shadowy picture on Channel 8.

Various things went wrong, which I had difficulty in putting right. One of them was a bright 'wiggly' line at the top of the picture. It was then that I first encountered 'Television' magazine, its editor Lionel Howes, and its ace contributor Les Lawry-Johns. I wrote and was informed that the boost condenser needed replacing. I continued to plague Mr Howes with requests for more and more information over the years, and I think he eventually banned me from writing. I probably used up all my goodwill. Les's column then was actually quite informative. He knew the stock faults of every set on the market, but in later years he would reminisce at length about his wartime service in the desert, the gin-diluting habits of his local and his eccentric customers 'Beardy' & 'non-Beardy', Jack Dawe and his brother Owen to name just a few. I know I preferred his later style although there were complaints from some of the more sensitive readers...

In my last year at university I decided to rebel and become a non-intellectual. I got a car for my 21st, which I would polish at weekends, and I got a Pye V4. Although not a pretty sight, it was a very sensitive set, which would easily get BBC from Tacolneston on a bit of wire. It was the era of the miniskirt – and my intellectual friends forced themselves to watch Top of the Pops in order to experience the true state of corruption which bourgeois capitalism had attained. Those evenings my room was full to overflowing.

An opportunity presented itself around then. My father knew the MD of Hartley Electromotives quite well, and managed to get me a holiday job in the long vacations. This spread to include every bit of spare time – the pay was good and the work incredibly interesting. For those who don't know the name, Hartleys in Shrewsbury was a two-sided company. On the one hand there was the 'Octopus' prefabricated wiring system – a good idea at the time whereby the entire wiring harness for a house was prefabricated and plugged straight into place.

I didn't have anything to do with that. The main business of the company was the construction of test equipment (the CT316 and 436 oscilloscopes), re-calibration of test equipment (mainly Marconi signal generators) and the manufacture and overhaul of Admiralty Sonar units. As a member of the Test Bay, my first action was to sign the Official Secrets Act. The presence of the military was constant but unobtrusive. The phrase 'the Admiral wants...' or, 'the Admiral likes it done this way' was used to make it quite clear that the standards of practice were altogether different from what had been permissible in domestic TV practice. All the components used were of the highest quality including the valves which were always CV. For instance, use of wire-strippers would result in instant dismissal (so I was told). The correct way to remove insulation was to burn it off with your soldering iron, thereby preserving all the cores. I still do this out of habit, and can immediately be identified by the smell of burnt plastic when I'm working on a project.

David East (left) and Jack Phillips (right): outside Jack's shop (Radio & TV, Clapham Road, SW8) - circa late 1960s



Each unit was built up on the bench by a team of wire-girls. I was at the age when embarrassment comes easily and is highly visible, so I imagine I brightened their lives a little. But the quality of construction at Hartleys was immaculate. Each solder joint was inspected and painted with a blob of green ink and the wires got up into tidy looms, the result being a joy to behold. Heaven help you if, in the Test Bay, you unsoldered a wire and burnt any insulation in the process. Then the whole thing had to be rebuilt. We often got units to test from other manufacturers. Plessey weren't bad but those from McMichael in Southampton were built by people whose careers had been spent making domestic products, and it showed.

I worked on most of the ASDIC units at one time or another. The technology was definitely 1950's and early 50's at that. Apart from the conventional electronic units, I learnt a lot about magslips and synchros; without giving too much away, the hydrophones of the ASDIC system fed into a series of amplifiers and phase discriminators. The output was then displayed on a CRO, and used to preset the depth-charge azimuth and direction. The 'works' of the system was a huge electromechanical analogue computer taking up one full wall of the design block. These devices, and others I worked on, used a variety of power supplies. The 440Hz came from an enormous rotary convertor in the basement. This was switched on in star configuration and, when the noise became overwhelming, you flicked it over to delta. If you wanted 1100Hz mains, you used the Savage. The Savage 1kW valve amplifier lurked at one end of the test bay, and had a vast double-triode output stage. It was fed from an ordinary Advance signal generator plugged into a co-ax socket on the bench.

The characters in the test bay were equally idiosyncratic. The boss was Ralph Evans. A dry stick, Ralph, when not in his office overseeing the staff would prowling round peering at your scope waveform and uttering remarks like

"Eeugh!" That looks very insanitary" or, "Call that sinusoidal? Looks suicidal to me!"

With a strong background in theory, Ralph would hold instructional sessions where I learnt about pulse circuits, especially relevant to the oscilloscope division. These sessions turned out to be invaluable when I came to repair TV's in earnest. In the storeroom at the back was a doll's head, just like the one in the Science Museum. It was generally held that Ralph had once worked with John Logie Baird and that the head in the Museum was a fake. I don't know the answer, but I'm sure the readers of BVWS/405 Alive will have a view.

Ralph's deputy was called Vernon Bloss. He was a good methodical bench engineer who could always be relied upon to help you out if you got stuck. Another character was Harry (H T) Link (I'm not making this up), who seemed very old and spent the entire time recalibrating American WW2 receivers. Who used these in 1967? I wouldn't dream of guessing. One of my jobs was to recalibrate ARC 52 UHF transceivers. On full whack the UHF got everywhere and all the test instruments went haywire. All other work was suspended until after I'd finished testing the output.

In 1967 my life took a turn for the worse. I'd had 3 relatively easy years at Cambridge with long vacations, but I now had to move to London, find a flat, and work for 3 years with 'normal' holidays! So I said goodbye to Hartleys. During the time I'd spent there I had absorbed much of the manufacturing philosophy that goes with technical excellence and my medical work has, I hope, gained something from my being taught there to 'do it right'. Hartleys has no memorial, apart from the odd CT316/436 at jumble sales and deserves to be remembered.

I arrived in London with the TV36C. My oldest friend Pedro was doing a postgrad degree at Imperial and we lived first in a Pimlico basement where I first encountered the difficulties associated with a strong signal and plenty

of reflections. Older readers (are there any other?) will remember the Hancock sketch where the 'Lad Himself' ends up hanging out of the window trying to get an adequate picture. In the days before flywheel sync, picture tearing was a fact of life you had to live with. But my first need was to boost my then, as now, totally inadequate grant. I still had the car and needed a life outside study and felt that, if I had managed to get an income from Hartleys, I might yet make it in the Trade.

My first foray was to renovate ex-rental sets and flog them to anybody who would give me a 'tenner' or so. After asking about, I chanced on the TV Graveyard. For those that never encountered this establishment, it was a shop at the top of the Archway Road piled high with ex-rental sets. The residing genius of the place was the affable Les Darling, who drove a large pink Chevrolet. I would visit Les and buy as many sets as I could fit in my car, take them back to the flat and try and make them work. With a minimum of test gear I would usually succeed, getting spares from the usual sources in Television magazine and particularly from Manor Supplies and its genial proprietor, Mr Sylvester. Surprisingly I usually made a profit of some kind on the transaction when it came to selling the TV. I remember however one hysterical occasion when a particularly smooth fellow-medic brought a couple of models along and I failed miserably to cut a deal. Eventually nemesis caught up with me in the shape of a GEC set which needed a new LOPT and tube. I realised then that this was a mug's game and I'd be better working for someone else.

Walking around Pimlico one afternoon I called into the local TV repairer and asked if there were any vacancies. He said he didn't have any but why didn't I go and ask Monty Marmont.

"Monty who?", I ejaculated.

"Monty Gottlieb. Shops at the Borough and Newington Butts - ask him."

So I did. Marmont Radio & TV occupied a small frontage on the dual carriageway around the Elephant & Castle. It was one of my first forays into South London. There was a small display area with a tiny room at the back where daylight never penetrated. A sort of signal was provided from a rickety X-array leaning at an angle from the chimney and the test equipment consisted of an AVO 7. We had come a long way from Hartleys. Monty asked me a few questions, I lied through my teeth and a part-time vacancy, Wednesday afternoons and Saturdays was mine, at the princely rate of 7/6 an hour.

It soon became clear that Monty's business was rental, in a big way. The sets were old, largely clapped-out and required turning round with the least expense in the minimum of time. I think that we did some work for outside customers, but the Elephant was a poor area and most of the clients were happy to pay a few shillings a week for something that, when it broke down or caught fire, was someone else's responsibility. I made it plain from the outset that I was a Bench Engineer, and was definitely not available for domestic repairs. I'd read enough articles in Television concerning amorous ladies, mad dogs and drunken husbands, and had no desire to be dealing with high voltages under those circumstances. Fortunately Monty had an Outside Man, Bill, who would climb the stairs in the blocks where the lifts had succumbed to vandalism and poor maintenance and would then try to put a metaphorical sticking plaster on the easy faults.

The Newington Butts shop was a claustrophobic place where street life was at a minimum, and the chief impression was of the dust and noise kicked up by the traffic. After a short time Monty told me that I should go to his other shop in Borough High Street and give Bob Hands some assistance. I'd never heard of this person, but Monty waved his arms in the air to signify Bob's second name. I don't think I ever visited Newington Butts again and if my memory is correct, Monty let the lease expire.

My first foray was to renovate ex-rental sets and flog them to anybody who would give me a 'tenner' or so. After asking about, I chanced on the TV Graveyard. For those that never encountered this establishment, it was a shop at the top of the Archway Road piled high with ex-rental sets.

By now I had experience of stock faults, and found myself doing the same things over and over again, i.e. sound faults on the Pye 11U, fires on the Thorn 950 and so on.

The Borough was palatial by comparison. There was a large showroom on the ground floor with a selection of new and second-hand brown goods, and at the rear was a counter where Bob plied his trade. As amiable a person as you would wish to meet, Bob was actually a very good TV engineer with astonishing patience. Those were the days of electromechanical push-button tuners, whose plastic bits fractured at a drop of a hat, and which drifted off-tune constantly. In my TV-merchandising days I would usually give up and visit Mr Sylvester for a replacement, but Bob had a real knack of fixing these extremely badly made units, saving the customer (and Monty) a lot of money.

The workshop was upstairs, well lit and boasted a proper UHF aerial. This was line-of-sight to the Crystal Palace and produced an enormous signal. It was therefore advisable, before sending a set out, to check the gain with the lower output of the VHF X-array. In point of fact I can't remember a set coming in with the complaint of poor BBC2 in those days. Later, when I went up-market and worked for Jack Phillips it happened from time to time, but I imagine most of Monty's punters had the set permanently on Ch 9. What I do remember was the shocking condition of the picture on many sets. You forget, now, how appalling it usually was: frame compressed at the bottom, line sync breaking up, picture ballooning, signal drifting. This was accepted without demur. It was only when the thing stopped working altogether that it was taken in for repair. Add a thick yellow membrane of tobacco, and you had your work cut out to get a decent result. By now I had experience of stock faults, and found myself doing the same things over and over again, i.e. sound faults on the Pye 11U, fires on the Thorn 950 and so on.

One day I acquired a Philips UHF conversion kit consisting of an UHF tuner and IF strip. This was in the way of a gift from Monty, and was immediately put to use. My smooth fellow-medic's parents were throwing out a 21" Ekco T356 and I felt it could be made to work on 625/UHF. After some experimentation we got it to perform quite well although the horizontal scan was rather non-linear. I seem to remember getting through one or two LOPT's in the process! By then Pedro and I had gone very much up-market, and were living in a ground floor flat in Notting Hill, just off Westbourne Grove. As an aside, we were paying the princely sum of £38 per month in 1967! Houses down there sell for upwards of One Million Pounds today. It seems unbelievable now that as a student on a grant (plus TV earnings) you could live in a posh part of London. Thousands did so then.

I then became aware that UHF reception was not straightforward. The possession of an outside aerial by a London flat-dweller was very unusual and although the reflection problem was not quite as severe, signal strength was a limiting factor, with the flat facing west/east and the Crystal Palace some miles to the south! Eventually we hit on a scheme whereby a short Yagi was suspended from the ceiling and the curtain rail with string. It pointed approximately nor-nor-east and about 30° upwards, the signal bouncing off the other side of Kildare Terrace. This lash-up served us well, and was still operational when I moved out in the summer of 1970.

I settled in and enjoyed myself. On every visit there were a few sets to repair, maybe the odd wireless or even an iron. I was left alone and got on with the job. On Saturday evenings I'd get in the car and drive to Oxford to see my girlfriend.

Borough High Street must have been redeveloped to death by now, but in the 60's it was a fascinating area full of original character. Gentrification was a developers' dream in those days although skips were beginning to appear in other parts of South London. Mostly the clientele were poor and lived in council flats. During breaks I got the chance to wander round and look at some of the sights, like Trinity Church Square and Borough Market.

One day after I'd been working there for the best part of a year Monty told me that I was needed by a friend of his at the Oval, and could I start there next week. I was sorry to leave, having made good friends with Bob. I knew I would miss the area, but I was in no position to argue and agreed to leave at the end of that day. The next time I visited South London I went straight to Jack Phillips, Radio & TV of Clapham Road, SW8. Jack's establishment was altogether more cosy and domestic, and this reflected the character of the proprietor. That side of Clapham Road had originally been a rather posh terrace from the 1820's or 30's, but at some time shop fronts had been crudely added.

So, after entering the shop, you went through the showroom and climbed what had once been imposing stairs up to the ground floor, but which had been reduced to a staircase. The original dining-room doubled as a workshop and contained a red plastic table with folding sides, a sink, and various kitchen cabinets, some of which contained valves and other components, and others which held tomato sauce, odd tins of baked beans, and cutlery. Through the back window there was a miserable view of a poky garden, piled high with scrap. Off to the right was staircase to the bedroom. This was piled high with valves. Hundreds and hundreds of spare valves, a real Aladdin's Cave! What happened to them in the end is a story, which can wait to the end of the account.

My first task was to negotiate a pay rise. I was now on 10/- an hour, commensurate with my enhanced diagnostic ability. Jack and I hit it off at once. He did take on the odd apprentice from time to time and if you missed calling for a few weeks you might bump into someone else working there but I continued to help him out for a couple of years so I became part of the establishment myself. The business was in Jack's name, but the power behind the shop-front, so to speak, was his wife Lyn, a formidable lady who would appear unannounced, and who seemed to have something to do with the accounts. Lyn had relatives in Hendon. I met them once, and was introduced to their friend Vishnyk, a tailor of Stamford Hill. He made my first proper suit! Thus did I become incorporated into the Phillips family circle.

Jack worked long hours. When he turned up to open the shop, his estate car was full of sets he'd collected en route, or had been unable to fix the previous night. There is an art to lifting and carrying a heavy set, and that was one of the new skills I had to acquire. The other technique was coping with mains voltages in primitive conditions. Jack's hands were gnarled and thickened through years of soldering, but mine were lilywhite, as befitted a medical student. Jack's favourite party trick was to grasp the live ends of the mains with two hands, and, grinning away, pronounce that it tickled a bit, but couldn't hurt you. I knew otherwise, of course, and was obsessional about keeping one hand in the pocket while working on live mains sets. I'd learnt about high voltages at Hartleys, working on 5kV DC-smoothed power supplies. One day I'd been on my own over lunch, testing one of these things, and earned a rollicking from Ralph. If I'd been shocked, there wasn't anybody about to jump up and down on my chest. Those who remember the trade test film with the mnemonic SIDE will know what I'm talking about. Jack had a CRO which, it turned out, was earthed. I nearly had a nasty encounter! Jack, relenting somewhat, installed an isolating transformer. I think that was the only time we had a difference of opinion.

His sort of clientele was by now pretty familiar. Mainly poor people living in council flats, their one panacea was the telly, and when it eventually gave up the ghost, a domestic emergency was declared. I justified working there as a type of family therapy, not wholly disconnected to my chosen profession! Once you'd fixed the main fault, mains dropper, PL81 or whatever, you found a whole ragbag of other things that needed attention, so a consultation with Jack was necessary to

determine how much they had to spend. Jack's own sets, on rental, weren't quite as bad as some others I'd seen and were even re-tubed when the faithful Grunther re-activator didn't effect a temporary cure. He had a number of dual-standard Bush and Murphy receivers, which were lovely to work on and quite reliable.

We did, however, get the odd surprise. The area round the back of Jack's started to gentrify in about 1968 – mainly MP's and other people who had to live near the House of Commons. We started getting Roberts radios, Dynatrons and our first colour set which was a Bush CTV 25. That if I recall had a power supply fault which was quite easy to fix. Jack and I looked despairingly at each other and hoped it wasn't the line output stage. We had, however, seen the trade test film where the technician sets the TV up while the little lady of the house watches in silent admiration and adoration. That prompted a fiddle with the static convergence and my first encounter with Carol Hersee's blackboard. It was the only colour TV I saw there.

We even sold the odd new set which, when unpacked hardly ever worked first time. TV's were unreliable in the extreme, and that was one of the reasons why establishments like Jack's were ubiquitous. The rental market, too, was a way of insuring against breakdown, which then became the renter's problem. When the Sony Trinitron appeared, with its uncanny reliability, the writing was on the wall not only for the manufacturers, but for the repairers as well.

Trade shows were always good for a day out. On one occasion, Jack and I ended up at the Royal Lancaster Hotel. That was the time the psychedelic Murphys were on display. If anybody has one, would they please get in touch? I thought they were very 60's even then. Jack was deaf and would create huge amusement by turning down his aid and asking for the set's volume to be turned up

"Ten watts? You call that ten watts? I can't hardly hear it!"

Then I got really hooked on the music. I'd be there all afternoon with BBC1 or BBC2 test transmissions so the music got really burned into my brain. It all seemed part of a 60's dream. Even at the time – walking back home across Hyde Park in the Summer of Love with Roger Roger's 'Long Hot Summer' and 'Chelsea Chick' playing in your head made you feel that even the people who chose the test card music had entered into the spirit of the time. I only found out what these tracks were called when I joined the Test Card Circle, but the names seem to fit exactly. And I still get reminders of those days. Remember the interval music for transmitter information? Heard it dozens and dozens of times. It's out, now, on CD. I played it for the first time in over 30 years a few weeks ago and it all came back.

I didn't spend all my spare time mending TV's. I hitchhiked round Europe during the summer when I could. The overwhelming impression was the generosity of ordinary people; businessmen who gave you lifts and ensured you'd somewhere to stay the night, or, single women in cars who trusted you. Working with Jack was like that. He was always generous and occasionally took me home to Beckenham where I met the rest of the family. It was a gentler time.

You might wonder if I did anything else, and had I bunked off medical school?

As the 60's ended I found myself doing more hospital-based work. I did a few weeks' obstetrics, and performed my statutory 25 deliveries, I spent a few weeks in Africa at the end of 1969 trying, unsuccessfully, to drum up Ethiopian government support for an up-country hospital which was chronically underfunded, and I sat my Finals in Cambridge. The end was now in sight, but the wrench of having to leave the flat and move into my cramped institutional room in the hospital in July 1970 was one of the most miserable experiences of my life. I continued to see Jack from time to time, purely on a social basis, and fortunately Pedro, who's no slouch with a soldering iron,

started helping him out. In addition Monty had by some means got a contract with Harrods to fix all their radios, so Pedro made himself useful there too.

I did not lose my interest in TV's however. Men after all need to have a hobby. I got a Thorn 850, with 625 conversion in 1971, and my first colour set, a Bush CTV176 the next year. The latter had been robbed of its IF strip and so a GEC strip was successfully patched in. This ran for several years without major attention and, finally, with increasing wealth, I bought a Forgestone kit, which I built up in a Murphy cabinet. This remarkable enterprise, the brainchild of a certain Mr Thrower, used top-quality components to ensure reliability and my set ran from 1980 until 1995 without breaking down. Had domestic TV manufacturers used the same care in selecting component manufacturers, there might still be an industry controlled in this country. The Forgestone still exists, in store because I haven't the heart to chuck it. Currently we watch a B & O LX6000.

In the garage, however, there lurks a small collection of dual-standard TV's and one highly prized Bush T410. A test-card generator, standards convertor and CD collection complete the ensemble, which enables me to re-live the experience. Smelling the gorgeous heady cocktail of ozone, hot dust and wax capacitors you are immediately transported to Jack's or Monty's of 35 years ago.

And finally, the story comes full circle. In 1997 I tried to set up a reunion with Jack and Pedro at Gerry Wells' museum. Jack was frail and couldn't make it but Pedro and I regaled Gerry with tales of the primitive conditions we'd experienced, and of our fortune in having escaped electrocution. But when we mentioned Jack Phillips Radio & TV, Gerry pointed out that he'd inherited the valve collection from Jack's bedroom! One of Jack's sons works for local radio and, while interviewing Gerry had mentioned the collection. So the shop is no more, but at least a part's been preserved, appropriately enough, in South London.

It's an odd thing to have spent my spare time doing, and I suppose that, professionally, I'd have been better off joining the bridge schools or playing golf on Wednesday afternoons at Medical School. However, I've always opined that you should do what you enjoy rather than what you feel you ought to do, and if I hadn't done it I'd have missed meeting some remarkable people and having some warm memories of a unique time in my life.

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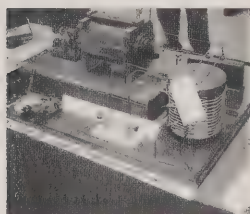
In search of the great cathedral...

by Steve Sidaway. Photography by John Howes

For any collector of American radios, one of the great events of this year was the auction of the Muchow collection. Dr Ralph Muchow was an Illinois dentist who had collected radios of all shapes and sizes since 1924 and had amassed some 3000 pieces of equipment, tubes and radio-related ephemera. 'Doc' Muchow died in 2000, and his family decided to disperse the collection by auction, consequently raising 1,034,151 Dollars. A record.



Mc Murdo Silver Masterpiece IV console set.



1912 Murdock-Heinze-Mesco spark transmitter

World War II spy radios



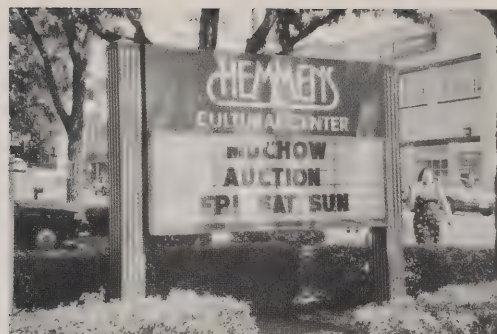
Now, for someone like your author, afflicted as I am by an as yet incurable disease (Loonius Curvicabinetus Yankus) which forces me to acquire old pieces of redundant electronics from across the Big Pond (Wettus Atlanticus), this was too good an opportunity to miss. At around the same time, early August, and almost in the same place (Elgin, Illinois), a large radio swapmeet, Radiofest XX was taking place and I'd promised myself for some years now that, having visited the Rochester swapmeet twice, Elgin was to be the next one to strip my wallet.

My old friend Frank Heathcote from Logansport, Indiana had lost his mind just sufficiently to ask me over again to stay in his beautiful stone-built house in Indiana (have to put this in so I get asked back). Now, Frank is that odd creature, a lapsed radio collector (I hear you say "Poor man.....wrap up warm, drink this hot french polish and repeat...Philco, Philco, PHILCO.....") who now has a passion for English sports cars, particularly Triumph.....well, no accounting for tastes..... With just a bit of wheedling and plenty blackmail in the form of food parcels containing McVities Chocolate Homewheat, Marmite, Newky Brown, liquorice allsorts, Frank was up for a trip to the auction/Radiofest.

The expedition started out really well. Standing in the check-in queue at Heathrow, ticket clutched in hot little hand, dear old Air India upgraded me to Business Class (they recognise QUALITY when they see it.....either that or someone who needs to be kept separate from other people....). The cabin crew understood at once about the all-important gin-and-tonic requirement and so, some 8 hours later, Chicago's O'Hare airport saw me poured down the steps of the plane and into the waiting limousine (thanks Frank..). But, O Lord, the weather.....!!!

Have you ever noticed the way other countries have WEATHER?? In Britain we have that rather nice and inoffensive greyness that passes for a climate, with the occasional burst of sunshine (three days in June). But, once abroad, there's WEATHER to contend with.....In the American Midwest, on my visit it was HUMID – oh boy, was it humid.....!!! Summer temperatures in the 90's all the time, brilliant sunshine, and HUMID. Now I know why they need all that ice and air-conditioning – the heat as well as Frank met me from the plane and within a few minutes the sweat started, and hardly stopped until I got back to London.

Anyway, back to the plot. After spending a couple of great days with Diana and Frank in Logansport, Frank

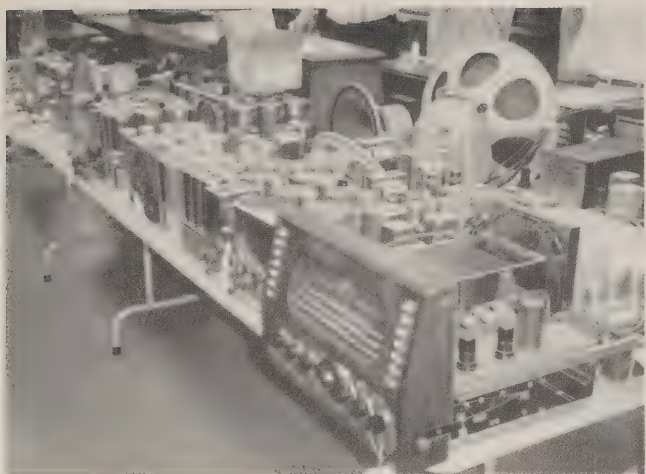


Rudolph Valentino's Brunswick Panatrope. It sold for \$13,000!

and I set off early one morning to drive the 180-odd miles to Elgin. Previously we'd used Franks' 1964 Chevrolet station wagon ('estate car' to us) for the buying trips, on the basis that it had enough room in the back to accommodate at least thirty radios, two or three consoles, a radiogram or two, and the odd bit of roadkill (well, I watched a LOT of the Beverley Hillbillies.....!!!). On this occasion the humidity dictated that we used a vehicle with air-conditioning (oh blessed air-conditioning) so I had to tone down the buying slightly. Frank had made the trip many times before so the journey up was fairly uneventful and like the resourceful fellow he is, he'd already made reservations at a decent motel not far from the Ramada hotel where the swapmeet was held.

I'd like to go on at length about the acres and acres of juicy bargains to be had, the plethora of spares and 'toobs', and how Frank and I had to hire a trailer to carry it all back....I can't. Frankly, the swapmeet itself wasn't all that wonderful. Oh, there was a fair amount of gear on display – Americans turn up at these "do's" with BIGGGG trailers, camper vans and 4x4's (curse these petrol-guzzling monsters – why does anyone want to drive a car that looks like a delivery van ??) full of radio bits and pieces. But there just didn't seem to be as much as at Rochester in years gone by, prices were (to me) fairly unreasonable in many cases, and it made me wonder if the Internet and its buying/selling activities is having a deleterious effect on these get-togethers? If so, just pray that it doesn't have the same effect over here...

Trailing round the car-parks of a motel from early morning to late afternoon looking for non-existent



Several Scott radios



Steve and Frank inspecting a cathedral



Phil Taylor with John Terrey (Editor ARC)



Preparing for possible rain



1914 spherical Audion regenerative receiver. Below: catalins, catalins, catalins!



Spoils of the Kane County fleamarket. Below: A \$24,000 Scott 'Baby Quaranta'.





A row of Philco and Scott consoles.



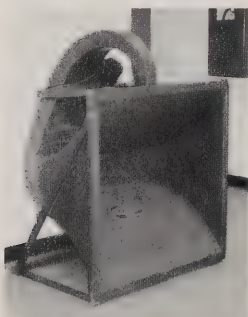
A small corner of advertising material.



Horns a plenty!



Richard Estes auctioning a Western Electric speaker.



Amplion theatre horn with 3 foot square mouth.

Below: Steve admiring a Philco console



collectables loses its attraction fairly quickly. But Elgin did turn up a couple of bargains. An Atwater-Kent 206 cathedral spotted by Frank in the back of a truck being unloaded by a very pleasant chap (this classic cathedral radio is featured in lots of the BVWS bulletin ads for Gerry Wells' Vintage Wireless Museum), and a nice Philco 89 cathedral in a great art-deco case, a real bargain for \$40 as a restoration project. A few dial lamps, a couple of knobs, a valve or two – and that was the extent of my bargains from Elgin – just to compare, my last Rochester visit netted about fourteen radios for my collection.....

By now, Frank and I had already met up with some other BVWS mates – John Howes and Phil Taylor – and we had a very pleasant ride out to a neighbouring city and did some 'antiqueing' round a few antique 'malls'. True to form, I couldn't stop myself and bought a parcel of early 20's 78 records without really thinking how on earth I was going to get them back to the UK unbroken....but when has any of us ever let little considerations like real life stand in our way.....??? The four of us had a great lunch courtesy of Howes of Southborough (thanks John) and, as viewing of the Muchow auction had started, back we went.....

The auction was held in the Hemmens Cultural Centre in the centre of Elgin, only two miles or so from the Swapmeet. Organised by Estes Auctions, who specialise in selling radios and similar collectables, it was laid out in a huge hall, with many items displayed well on special racking. On first sight it was truly impressive – hundreds and hundreds of good quality radios (even a mechanical TV or two) from the 1920's to the 1950's, together with rare and exotic pieces of advertising ephemera, and a host of rare valves. Some items made an immediate impression – an Atwater-Kent serviceman's bench, heavily restored I have to say, but the core of it original, complete with meters and test speaker – the enticing

gleam of MANY Scott multi-valved receivers in their chromed splendour, and many other juicy items.

But this, of course, was an auction.....with a specialised, carefully selected set of buyers - and I had to bring myself down to earth slowly with the realisation that most of this would fetch LOADSA money and be outside my league, and I'd also have to pay to ship it back to the UK. So I started to view and 'ooooohhh' and 'aaahhh' with the rest of them, but ended up with only five lots (wooden cabinets with rounded tops of course..!!) which REALLY interested me.

Now, Frank and I initially thought that we could estimate timing when these lots came up, and maybe go off to do some exploring around the surrounding areas, find some decent beer, etc....in the intervals between bidding. And here's the weird bit. Although everything had a lot number, as you'd expect in an auction, the auctioneers announced that they WEREN'T going to auction in numerical order !!! Just pick lots at random.....Which meant that it wasn't even safe to leave the auction room to answer a call of nature in case your lot came up while you were out. Ridiculous system.....so I decided to downgrade my expectations from the auction and not stay to bid – ESTES AUCTIONS, YOU LOST A BUYER – and Frank and I left John and Phil to it.

Now here's the best part. Frank knew of a huge local monthly fleamarket, so good that he used to drive 80 miles from Indiana every month to attend. And it was on that very weekend, and only about eleven miles away at the county showground. Now I'm someone who was weaned on jumble sales, nurtured on junk, and still gets through at least two boot fairs a week, rain or shine. So acres and acres of good American tat, laid out in the sun for a discerning English buyer to peruse, was too great a temptation to resist – so I didn't...

Kane County fairgrounds followed the established pattern for these places (anyone who's ever been to



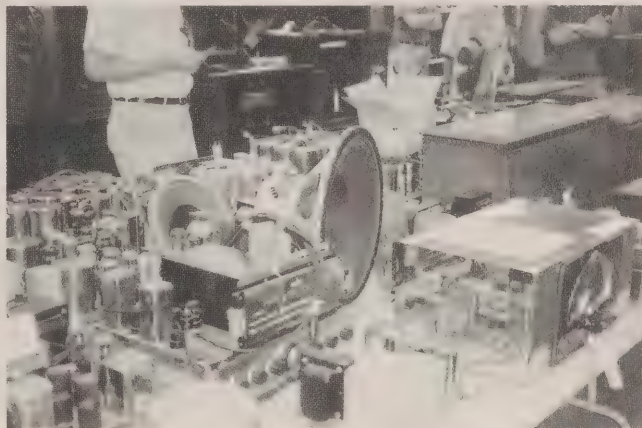
Smokerette and pipes



DeForest regenerative receiver and T300 tuner



Original Atwater Kent service bench. Shame about the legs Steve!



More chrome. McMurdo's and Scotts

Newark or Ardingly antique fairs in the UK knows what I mean) – acres and acres of space, outdoor buildings for showing livestock, bars (essential for farmers) and food stands. And there was just SOOOO much to see and buy – doubly interesting for me of course because it was all-American junk rather than the British or European (where DOES all that 'orrible French kitchenware come from..??) equivalents. And it was good.....in fact I had a better time at the fleamarket than at either the Elgin swapmeet or the Muchow auction – cheaper too!!!

First off was one of those just-out-of-the-van moments we all dream about. Frank and I just rounded the corner of a large lorry being unloaded at great speed onto trestle tables. A Pathe 'Baby' 9.5mm cine projector from the 20's was standing on the stall (I'm still fond of the old centre sprocket gauge), and I was turning it over when Frank asked the stallholder if he had any old radios on. "Sure"... ..and a model 20 Atwater Kent radio (about 1925) was plonked in front of me!!! "I have more" he went on, "a bit rarer than that"... ..and the next thing I knew he'd brought out an RCA Radiola V... This is, in effect, a crystal set and three-valve amplifier, put together on a mahogany base with matching cover, dating from 1923, and rare... ..then he brought out another one... ..At this point I was half-wondering if this man had cleared one of those mythical barnfuls of carefully stored classic radios we all know exist somewhere (over the rainbow, Xanadu, Valhalla...) but, apart from a few 40's bakelites, these were the cream of the crop. Anyway, one Radiola was in much better condition than the other, and we eventually, after lots of friendly haggling settled on a good price for the AK, the better Radiola, and the Pathe projector.

I soon homed in on a couple of nice cathedral radios sitting at the back of a stall full of early electronic type items. Both needed a bit of TLC but were 'all there', and one was a Philco model 20, the first cathedral radio Philco made in 1930, and this was the 'deluxe' version with a burr-walnut arch and fluted pillars flanking the main controls... ..been after one for years... After these buys I found I was now out of travellers cheques and cash, and Frank was beginning to look distinctly worried, like 'how the hell are we going to get all this stuff back to Indiana and ship it???' sort of worried! These of course are things that the true collector (read 'looney') KNOWS will get sorted somehow, at a later date, preferably by someone else... ..although by now I was also

hoping that the bids I'd left with Phil and John on items in the Muchow auction (one of which was a LARGE Philco console radio) hadn't been successful! So, after buying a few more essentials like some pickles and fresh veg from the farmers' market on the same site to take back to Indiana, we hit the road back to the auction hall and our hotel.

Well, it must have been the first time in years of bidding at auction sales that I was GLAD that I hadn't bought anything!! The auction was certainly well-attended, with most of the well-known figures in the American radio collecting field in evidence. Bidding was pretty spirited too, with some high, not to say ASTRONOMICAL prices realised for many of the lots. John H was beaten for a Scott radio he'd set his heart on, but Phil Taylor managed to secure a couple of bargains in the tube field.

So that's a quick skim through eight days of holiday and indulgence in the USA, and one of the showpiece auctions of the year. You can see a summary of the auction results on the Antique Radio Classified website if prices are your interest – and they shouldn't be – (ARC is an excellent website to look at anyway, and they also publish a great magazine if you like American radios), and for the hooked-up and online amongst you there are lots of websites featuring galleries of the American sets I've mentioned in the text.

I've missed out the great hospitality of Frank and Diana Heathcote and their friends, seeing a lot of the American Midwest, wandering around the County Fair at Cass County Showgrounds, eating elephant's ears (believe me...), two days of frenzied activity in Frank's workshop packing and despatching radios (they all got back in one piece by surface mail – it IS possible!) and so much more. I've vowed never to do this again – but, I'm sure that one day, when the wallet has recovered, you'll find me in the check-in queue, ticket clutched in hot little hand.....

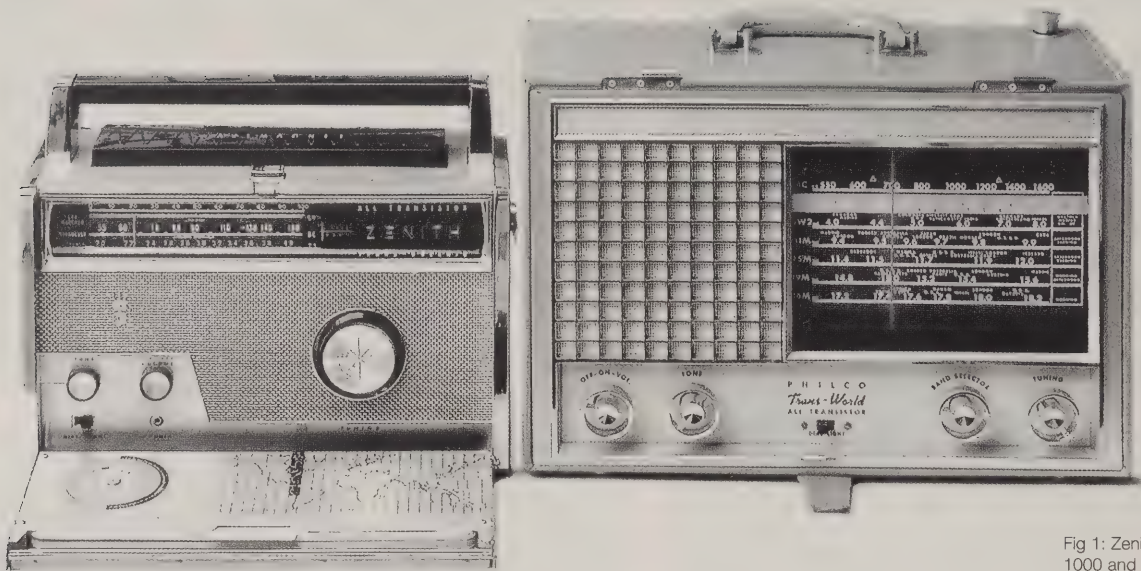


Fig 1: Zenith Transoceanic 1000 and Philco T9 Trans-World

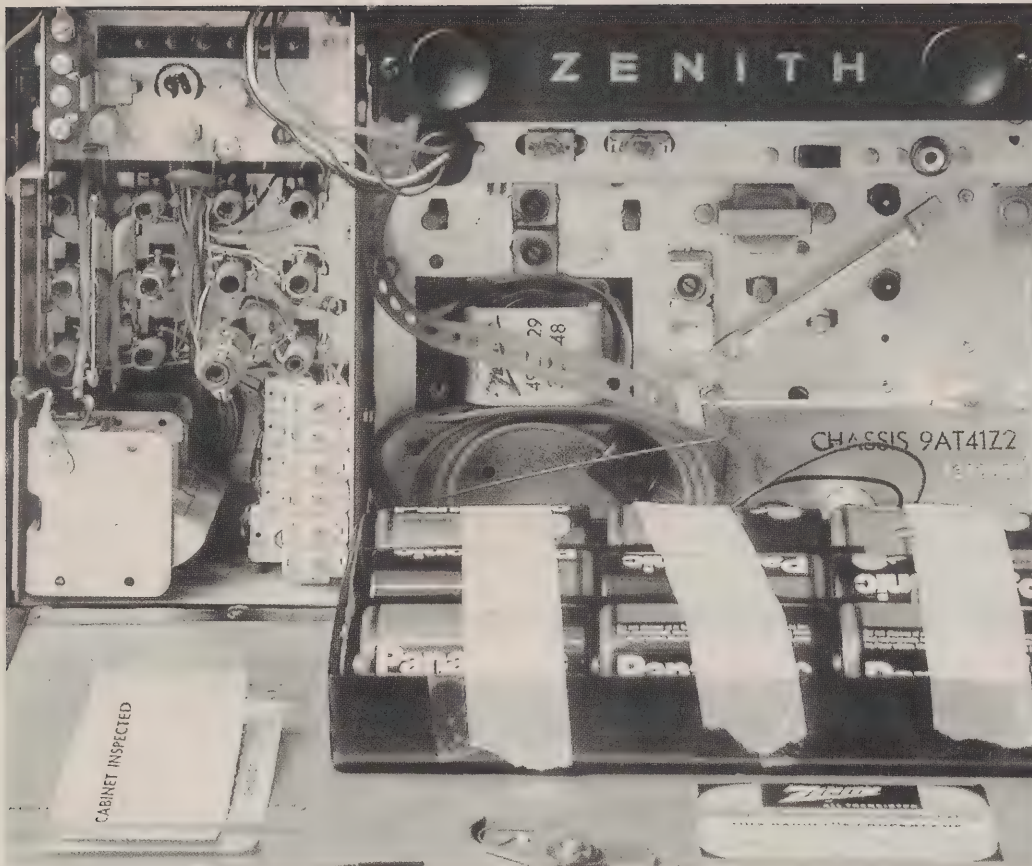
For the man who had everything – Part 2 Zenith Transoceanic 1000 versus Philco T9 Trans-World

By Jim Duckworth

So the era of luxury world-band valve portables drifted towards a close in the late 1950's and the first fruits of the new Transistor age appeared in 1957 with the launch of the Zenith Royal 1000. It happened on November 5th in good time for the Christmas season and LC Truesdell, the VP of Sales and Marketing gave a worthy display of fireworks in his upbeat introduction to the 'World's first all-Transistor Bandspread short wave Portable'. It was a \$300k Development and Production investment, had eight wavebands, nine transistors and was described as the 'Most magnificent radio receiver ever built'. (The word 'Bandspread' was significant, as Magnavox had just introduced the AW 100 Inter-Continental model. This was a high quality 'Transoceanic type' product but with 4 wavebands giving continuous coverage only, they had ducked the bandspreading issue and it never caught on). Zenith Dealers had received a Mail Shot one week before the Press Conference, exhorting them to spread the word amongst 'Executives in commerce and industry; members of the professions; outdoorsmen' etc, etc. In other words, it was very much a luxury high end item, having the 'precision look of the finest camera' ...reference no doubt to the Leica 3G which Commander McDonald had just acquired...and at a launch price of \$250, the comparison was apt. It was the world's most expensive portable receiver by a long way.

Anatomy of a Transistor World band Receiver.

In Part one, the major issues attached to the development and production of a luxury valve bandspread portable were outlined and the designer of the transistor equivalent, faced all of these and many more! The difficulties tended to multiply with transistors. Of course there was the fundamental issue of transistor versus valve circuit design technology. But in this regard the US giants, and particularly Zenith, had a good three year lead on the rest of the world, having already established a formidable track record of design excellence in both RF and AF circuitry. It was an incredible achievement, if you think about it, to be launching an eight-waveband 'communications type' receiver at a time when (for example) most UK and European manufacturers were either struggling to develop single band products or had not started at all! But the difficulties lay once again in the front-end detail, i.e. given eight wavebands and therefore 24 coils and trimmers to arrange around some highly reliable switching system etc, a further dimension was introduced by the need to match the low (and frequency dependent!) transistor input and output impedances to those of the various coils. This generated more switch poles and ways, more circuit complexity and a high risk of instability. In addition, the best configuration for a tuned Rf amplifier and local oscillator covering the range from MW to 13metres had not yet been established and was a challenging development task with the constantly changing (but improving!) parameters of early transistors. A project of this nature was beyond all but the most capable of engineering departments and remained so for many years. On the credit side however, was the possibility at last of reproducing a genuine 'Transoceanic type' receiver, but with half the size and weight, more than twice the undistorted output power and with negligible running costs from 'flashlamp' batteries.



Below - Fig 2: Zenith 1000D handbook showing the set alongside the Commander's Leica 3G.

Left - Fig 3: Zenith 1000D rear view showing the coilpack and removeable wavemagnet.

The Zenith 1000D

So the Zenith 1000 shown in Fig 1. is the 'D' version. 'D' signified that the set had a long wave band making a total of nine bands. This was a \$25 option introduced six months after first production started making a grand total of \$275. It was a 12volt design having 9 transistors, three of which were deployed in the front end as grounded base Rf amplifier and separate oscillator and mixer. They were VHF diffused base Germanium products, introduced to them by RCA, which surfaced later in Europe from Mullard/Phillips as the OC170/171, then AF115/117 etc. The RCA versions did not need the ground lead to be snipped in later years, so they clearly knew something that Philips didn't!! There were two IF amplifier stages followed by a diode detector. A total of one double tuned and two single tuned transformers were employed. An AGC amplification system was implemented by feeding dc control from the diode back to the base of the RF amplifier and cunningly distributing the amplified dc from the emitter to the mixer and first IF amp bases. It worked very well and carried on unchanged in the later Royal 3000 which was the Royal 1000, substantially redesigned as an AM/FM receiver. The first AF transistor was used as a high impedance emitter follower stage to allow a switched phono input. This provided approx. a one megohm input impedance and was a leading edge piece of circuit design for its day. Three more transistors were used in a conventional push-pull audio amplifier, delivering however an audio output of 500mw, thus achieving a world first for portable radios. With regard to styling, the Commander had got his wish and the cabinet, which was much more compact than its valve predecessors at 12.5"x8"x4.5", was finished in a combination of black leather and satin chrome similar to his Leica camera. The owner's handbook (Fig 2), showed them side by side, the ultimate products for the 'man with everything' and after 45 years, most of them will still be around somewhere.



Zenith 1000D first impressions

So on opening the lid, the first strong impression is that of a high quality precision instrument. This is reinforced by the tuning dial being designed as a rotary drum, (driven by a conventional wafer switch actuated from the side), showing one band at a time through the window. This design contributed to the overall compactness of the receiver and was carried through to the Royal 3000 and 7000. Front panel controls were simple with tone, volume and on/off, and tuning, the latter had a nice precision 'feel'. In addition there was a biased slide switch for the dial light and an earphone socket. The telescopic aerial was concealed in the handle, which was simply unlatched to extend it. This was a potential weak point mechanically as the plastic 'shell' around the rod was not strong enough to carry the set fully loaded

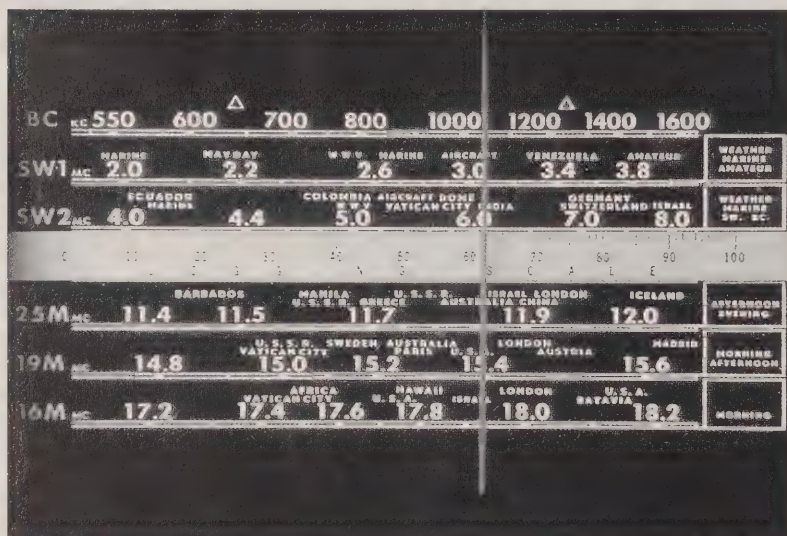


Fig 4: Philco T9 Trans-world Radio.

Fig 5: Philco T9 dial showing the moveable cursor/logging scale.

with the weight of nine U2 flash lamp batteries over long periods. Fig (3) shows the interior and the metal chassis construction. This was a very 'safe' RF design, a PC board was never used on the bandsread models. As a further production and servicing convenience, the transistors plugged into sockets in the same way as the first 'Owl eyes' pocket radio two years earlier. The coilpack on the LHS had its formers protruding through

to the rear where an equal number of coils were mounted, alignment from the front was achieved via the 'hollow coil core' technology referred to in part one. It was a compact and stable arrangement but definitely needed the Zenith diagram and chart to perform an alignment! In the top right hand an extra wavemagnet was stashed complete with rubber suckers. Yes, you've guessed it. It was supposed to stick on the same train or plane window as its predecessors! What you have to bear in mind is that the model 600 valve Transoceanic was still in production and advertised and sold alongside the new Royal 1000, which therefore had to have at least the same minimum features, and more besides, at the higher price. So the removeable wavemagnet was there, along with a switched phono input the last time either were to appear. They were quietly dropped when the Royal 3000 was introduced in 1962 and valve Transoceanic production ceased. I received my 1000D in very good condition and it only needed a minor alignment touch up to bring it to full spec.

The Competition gets down to business.

Zenith's competitors needed no convincing to join the fray as the luxury portable market was now well established. Furthermore, the liberation from special HT batteries and differing mains power supplies gave more scope for export opportunities and higher production levels, though the vast US market remained the primary target. So it was not a question of 'if' but 'when'. As already mentioned, Magnavox jumped the gun with the non-bandsread 'Inter-continental,' but more serious challenges were to come from radio companies who were already semi-conductor manufacturers in their own right and had advanced application effort in house. This included RCA, GE and most importantly Philco. They had pioneered Surface barrier transistors since 1953 and moved on to their proprietary MADT (Micro Alloy Diffused Transistor) technology. This was now getting into its stride, yielding transistors with high current gains at low values of collector current and excellent performance up to the UHF region, thus making them very suitable for a MW to HF front end. The trade-off and snag was the low maximum collector voltage at around 9v. But Philco seized the opportunity to use their own transistors and in early 1958 launched the T9 Trans-World, based on a 6v-battery supply. It was a 7 waveband, 9-transistor bandsread receiver of striking appearance, high quality and price and whose performance received immediate acclaim. I managed to import one of these from the USA and after necessary restoration was able to compare it with the Zenith 1000 Transoceanic.

The Philco T9 first impressions

Fig 4 shows my receiver following restoration. Large at 16"x10.5"x6", the first impression on opening the lid of this 'genuine top grade cowhide' suitcase, is one of surprise as the huge colourful time zone map hits you in the eye. It occupies more than half of the lid interior, the remainder going to the owner's guide and SW manual which is held in place by an adjustable brown strap. The whole lid is designed to detach from the main cabinet body by sliding to the left and exposing the set top, with handle and extra large stylised rod aerial tip. The front panel is a bold and dramatic piece of 1950's design with a heavy chrome 'honeycomb' speaker grill and highly stylised chrome knobs. The slide rule dial Fig 5, is well laid out and very clear with white on black. There are seven wavebands, four of which are bandsread from 31 to 16m. They even managed to infuse some 'romance of communications' Hallicrafters style, by inserting a discreet number of far-flung station names. The tuning knob driving the long red scale pointer had a heavy flywheel allowing the scale to be traversed with a single spin. The other controls included a tone control and biased slide switch for dial illumination. A further refinement and possibly unique feature, is the combined waveband indicator and logging scale. This satin chrome

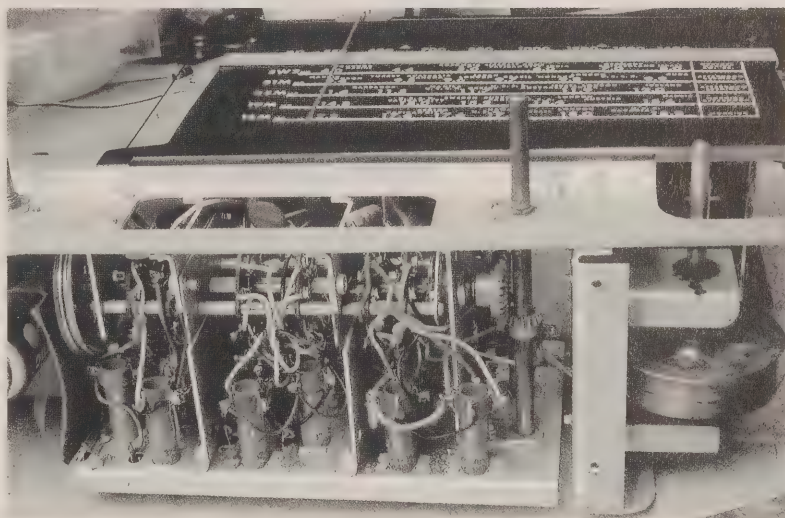
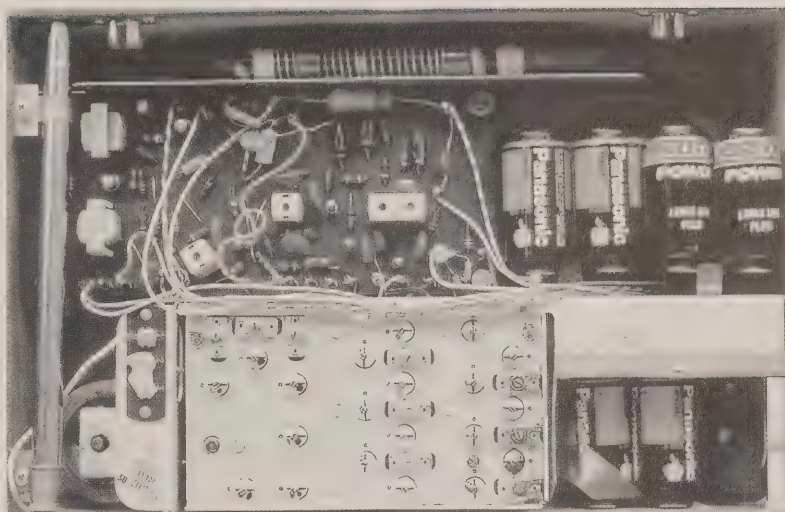
'Engineers type' ruler, actuated by the waveband switch, moves up and down to underline the band in use and add a high degree of resolution, especially to the bandspread bands. It is a quality engineered luxury touch symptomatic of the whole design approach. Indeed, in the long and detailed handbook introduction, engineering director Donald G Fink stated that the 'Philco engineers were encouraged in designing this receiver to do what they dearly love to do, "throw the book at it"'. What a refreshing statement if true – we could have done with a few such projects on this side of 'the pond'!

A review of the circuit and works

The circuit employed three special VHF MADTs: an RF amplifier operating in the grounded base mode, oscillator and mixer then two medium frequency ones in the IF amp stages, which had one double tuned and two single tuned transformers. A further Rf transistor was used as detector/AGC amplifier and first AF, which was quite an unusual arrangement. Following detection, this provided a high-level dc control signal back to the RF amplifier, mixer and first IF and a high audio output via an AF transformer to the three-transistor audio amplifier, which was rated at 250 Mw. The whole circuit was easily able to drive the excellent 5.25" speaker to full volume from low-level signals. Fig 6 shows the back of the leather case opened up to expose the works. A rather untidy looking PCB sits above the main chassis, which contains all of the front-end coils and trimmers. Their circuit references are engraved on the rear metal panel, so a complete alignment could be done with the chassis in cabinet. A huge 0.75" dia ferrite rod aerial sits at the top, with the batteries on the RHS above the 5.25" loudspeaker. The top four provide the 6v supply for the set and the other two a constant voltage and current bias supply for the local oscillator transistor. This was to ensure completely drift-free performance on the short waves, the handbook claiming another Philco 'first'. It probably was, but also something of an overkill to use the U2 flashlamp batteries for the purpose, though they did enjoy a full shelf life. The telescopic rod aerial mounted on the LHS was a whopping five-foot long fully extended but for more distant reception a long wire could be connected to the panel nearby. One minor problem, with the rod aerial in use, it 'snagged' on the back of the leather case lid, eventually wearing a furrow in it.

Firing it up and finding the faults.

So I loaded it with batteries and switched on in the full expectation of it 'working well on all bands' as the Ebay Seller had claimed. A deathly silence greeted me so I swiftly performed my number one test, which is to measure the current (if any) being drawn. It was very close to the data sheet 17Ma, so I looked more carefully at the PCB and didn't know whether to laugh or cry! Right in front of me and in place of the (special MADT type) transistor in the mixer position sat a brand new silicon transistor! Caveat Emptor indeed. Inspection of the circuit diagram showed the emitter resistor had the unusually high value of 39k ohm and with approximately 4 out of the 6 volts across it, the main collector-to-emitter current was evidently designed to be around only 100 microamps. This would have been very low for a normal germanium transistor where the optimum value for additive mixing normally lies between 250-500 microamps, so this was definitely designed with only a MADT in mind, which presumably worked optimally at this very low current in this particular circuit. A silicon transistor, which in any case required an extra 0.4 volts on its base to turn on, had no chance at all. Thankfully, the bright spark responsible for this annoying vandalism had not tried to tinker with the bias values and inflict further damage. So what to do? I did not have a replacement MADT but did have several 'new/old' Germanium VHF OC171's that were the closest I was going to get. I selected the one with the highest dc gain



(smallest Vbe to turn on), pre-snipped that notorious earth lead, soldered it in and Hey presto, the set sprang into life, and what life! It positively bubbled over with it on all bands. After the initial excitement died down I identified various faults which included distorted audio, AGC not working properly, instability in various places and the need for a general realignment.

Top - Fig 6: Philco T9 chassis rear showing PCB and coil pack adjustment panel.

Above - Fig 7: Philco T9 coilpack with waveband change mechanism and flywheel.

Fixing the faults and final restoration

The audio and AGC were promptly fixed by replacing badly leaking electrolytics. The instability was more difficult to nail down and had two different mechanisms. The first was a form of virulent audio squegging, which I finally traced to a defective ceramic capacitor decoupling an RF choke supply filter. The second was Rf instability, which would kick-in when switching down to the 16m band, clearing when the set was cycled on and off. I was mortified to trace this back to my OC171 mixer 'implant' as it showed its impedances were too different from the MADT in this low current circuit. Further inspection of the circuit diagram showed that the MADT in the RF amplifier position was more conventionally biased so I decided to transplant this one to the mixer slot and put my OC171 in the RF amp position. It worked! And I was now listening to a set with extraordinary sensitivity, fidelity and selectivity which was surprisingly good. Next item was to thoroughly clean the dial and inspect the inner works and for this the chassis had to come out, which was done by removing four bolts underneath and two inside. Fig 7 shows the very

As for the Zenith 1000, it was an important set from several viewpoints. Firstly, it was the pioneering reference design for multi-waveband transistor receivers in 1957 and beyond. Secondly it carried through the heritage of five generations of valve Transoceanics, outgunning them all in terms of waveband coverage.

rugged and well-built coil pack, waveband switching and tuning drive assembly. The 3-gang condenser (not shown), had a massive 0.5" dia spindle to handle the torque transmitted at right angles through the tuning drive system. It was very impressive, I have worked on both professional and military equipment which were not in this 'build standard' league! The final task was a quite lengthy but rewarding alignment procedure bringing all bands upto a high degree of sensitivity and scale accuracy. I was now ready to compare it to my Zenith Transoceanic 1000D.

Comparisons and conclusions

So how did they do? I stood them side by side and tuned in various stations across the bands. As with the valve models in Part one, sensitivity was excellent. With the telescopic aerials fully extended I was able to resolve long distance signals with ease though Zenith had the edge on the 16m band and performed remarkably well also on the 13m band which Philco did not have. Regarding selectivity, Philco had the edge. Both receivers had the same IF arrangement of one double tuned transformer (made up from two singles – top capacity coupled) and two separate single IF transformers. But going from circuit diagram values and a wobulator inspection, the Philco double tuned arrangement appeared to be designed for critical coupling, whereas the Zenith was overcoupled somewhat giving a slightly broader bandwidth, and it showed in practice. (The Royal 3000 was to fix this with no less than three sets of double tuned along with one single tuned IFT!).

How did they sound? The Philco had quite astonishing fidelity. The combination of excellent AF amplifier design and a high quality 5.25" round speaker in a larger cabinet produced a sound of great depth and clarity. AM broadcast on both medium and short waves has seldom sounded so good in a portable radio. The Zenith was no slouch either. Its high 500mW capability allowed normal listening levels to be delivered with ease and comfort. Putting them in perspective: the Philco T9 was built to an extraordinarily high standard mechanically and was of great interest electronically,

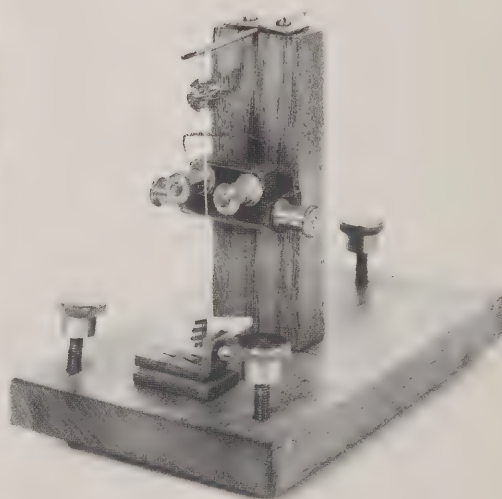
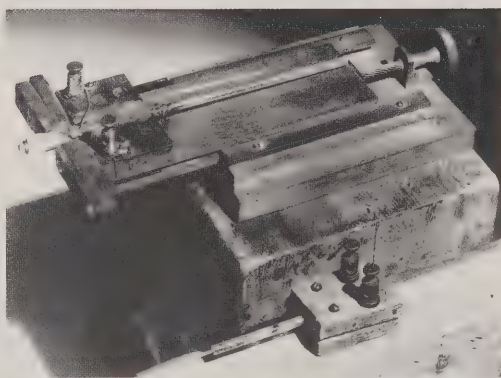
being the only production world band receiver to be based exclusively on MADT transistors. Stylistically it was something of a 1950's icon – you either like that kind of thing or not – of eccentric appearance with the lid raised and global map in position, it looked large enough to be mistaken for a valve design. However, with its sumptuous tan leather case, high build quality and fine performance, it should have done better. But it's a tough world up there in the \$250 price bracket and it never hit high production numbers, making it very rare and collectable today. As for the Zenith 1000, it was an important set from several viewpoints. Firstly, it was the pioneering reference design for multi-waveband transistor receivers in 1957 and beyond. Secondly it carried through the heritage of five generations of valve Transoceanics, outgunning them all in terms of waveband coverage (9 instead of 7 with LW and 13m bands). It was the last set to be approved personally and 'signed off' by Commander McDonald who had specified its 'precision instrument' type of appearance and the Zenith Corporation showed great confidence in selling it alongside the still highly successful 600 valve series. The 'man who had everything' gave it an unqualified 'thumbs up' and it quickly went into high volume production, only giving way to the Royal 3000 AM/FM redesign after five years. During the 1960's various competitors appeared around the world. Braun of Germany produced the much-acclaimed TW-1000 as a 'one off' and Grundig established the 'Sattelitel' dynasty. Sony produced the 'Earth Orbiter' which was a kind of copy of the Zenith 7000RD – a non bandspread set produced at the end of the Transoceanic age when the Zenith (Radio) company was in serious decline. In the UK we almost made a contribution! – But the Perdio 'Marco Polo' never got into production as the Company went bankrupt. By the late 1970's, the age of luxury analogue 'worldbanders' came to an end as new digital technology took over and the exclusivity and 'romance of communications', alas, died with it, leaving however a heritage of really great portable receivers, both valve and transistor, to restore, use and preserve for future generations' pleasure.

Lost at NVCF, Birmingham.

The original copies of the photographs reproduced on the right have gone missing. They were left (without his knowledge) on John Narborough's stall at the National Vintage Communications Fair on April 16th earlier this year.

The photographs were inside an envelope marked for the attention of Ian Higginbottom and Anthony Constable.

If anybody has any knowledge regarding the whereabouts of these photographs could they please contact the Editor on 020 8469 2904.



This time round I thought I might try my hand at making a cabinet from solid wood. As my range of tools is rather limited this would present some challenges. I came across a solid wood shelf 12 inches wide and about 6 feet long. It was made of pine and it seemed to me that this would be suitable.

Now hindsight is a wonderful thing. Making a cabinet from pine is, to say the least, an interesting experience. Although the end result is fine, arriving at this point was at times very frustrating. I would not have believed it possible for wood to change its shape so often, so rapidly and so much. Every change in humidity and temperature seemed to bring another perverse contortion in the panels but each one differently. I tried all the tricks, laying some of them in the sun, putting some in the conservatory, bringing them indoors placing some near (but not too near) radiators. Well I got there eventually but next time it won't be pine.

In order to make a cabinet you need a design and the dimensions. The size of the front panel and baseboard were given in the original list of parts and these set the internal dimensions of the cabinet. By examining the published photographs and scaling up I was able to establish the thickness of wood used and the style of edge moulding. From this it was an easy matter to fix the external dimensions

Based on this, I produced drawings and worked out a simple method for joining the panels together and fixing the back.

A bench-mounted circular saw was used to cut the panels to size and produce the simple moulded profile on the edges. The top is made from one panel, which was slit down on the saw so that the pattern in the grain matches. The front part is fixed to the cabinet and the rear section is attached by a piano hinge, with a brass stay to hold its position when open.

The whole cabinet was assembled in its bare wood state using screws to ensure that all the parts fitted together. It was then dismantled for rubbing down by hand, staining and polishing. I used a spirit-based stain as this has the advantages that it tends not to raise the grain and dries adequately in about 24 hours. To maintain some authenticity it was finished using Button Polish (as used by French Polishers).

Just as I am no cabinetmaker I am also not a French polisher. However a passable result can be obtained by giving each panel a thin coat of button polish using a good quality 1-inch bristle varnish brush. This has to be done very quickly starting from one edge and working across the panel brushing in the direction of the grain. Each panel needs to be completed in about a minute or less with no going back over parts already covered. This can only be done in practice with the cabinet in its disassembled state.

If the wood is not too absorbent one coat will give a good result. In this case two coats were needed but this is probably about the limit for this technique.

After leaving the parts for 24 hours to harden the cabinet was reassembled with PVA glue and brass woodscrews.

Construction

Having done all of the foregoing we have now arrived at the point where the typical 1930s home constructor would start the process, i.e. with a complete set of "new" parts.

Many companies, which supplied kits of parts for published designs, would boast about how quickly the set could be assembled. These claims typically ranged from "one evening" to "one hour" depending on the complexity of the set and the optimism of the seller. Well it can be done, however although what you end up with may work, it won't be a work of art. The actual assembly of the set took me about 10 hours. To assist with the accuracy of this I took photocopies of the wiring and layout diagrams and blew them up to 100% scale.

All components and parts were fixed with brass woodscrews. Modern plywood tends to be rather soft

and in order to get a firm fixing with the smaller screws (No 2 or No 4) it is best to make the holes with an awl. For No 6 screws pilot holes were drilled.

Full step-by-step assembly instructions were provided by the designer, however these are not necessary. Providing you have the layout diagrams and some photographs of the completed construction it's a matter of common sense.

I connected the finished set to my bench supply, aerial, earth and speaker and switched on. It worked first time. As all components had been fully tested (including the valves) prior to assembly I would have been disappointed had it not.

Using the Set

Well, building a replica is an interesting exercise. However if a wireless is not used then it is just an ornament. This one is used - every day.

As I mentioned at the beginning of this piece, the set is provided with its own dedicated eliminator. It has one or two interesting features, which led me to christen it the "Invisible Eliminator". So it may become the subject of a future article.

As a domestic receiver the ST300 performs to my complete satisfaction. I am an avid listener of Radio 4 and the World Service and the set will receive both of these at good loudspeaker strength with an aerial composed of just a few feet of wire lying on the floor. On a "proper aerial" (mine is very modest – little more than a download) it brings in numerous stations from the Continent and beyond. Several times I have tried to establish how many and always lost count but it is quite a lot. Over a good part of the medium wave a station comes in for every degree of the dial.

So why "Golden"?

At the beginning of this article is the title "A Golden ST300". Is this because I think this set is imbued with some magical quality? Or perhaps I am so proud of my handiwork that this set is very special to me? Well I may be pleased with my efforts but not *that* pleased.

No: it's because of the *colour*. An original cabinet for this set would have been mahogany or oak. However having made mine of the wrong wood I thought I might as well go the whole hog and stain it the wrong colour too. The stain I used was Colron "Mellow Pine". Over the last few months, as is the nature of pine, the colour has deepened and the set now possesses a pleasing golden hue. Or is it just my imagination?

Well, building a replica is an interesting exercise. However if a wireless is not used then it is just an ornament. This one is used - every day.

Size is Everything

You might have noticed that this issue of the Bulletin has more pages than normal. Historically, this tends to be 48 pages. This edition however has 64 because it was felt that all future issues should be larger in order to comfortably incorporate the '405 Alive' content. Therefore for three issues of the year the Bulletin will comprise of 48 pages and 64 in Winter.

All I have left to say is that I hope you enjoy this issue of the Bulletin and have a Merry Christmas and a happy new year!

Carl Glover

'The Radio Salon' Watford Images from my collection

by Dave Newman



Cameras and microphones situated at Alexandra Palace, the new home of British Television, are harnessed to mighty dynamos that provide the power for the throwing out into space of television programmes.

These pictures first came to light when I visited a fellow wireless collector. Apparently this chap had been a travelling sales representative for an electronic components distributor before the war. He had called upon this particular dealer for many years and when the shop finally ceased trading sometime in the late 50s he was given the pictures as a memento. Ever since that time the images have been hidden away. As he could sense my fascination with them a deal was struck and they have been in my workshop ever since.

I am sure you find them as evocative as I do as they transport you back to those golden days.

Transcription of press cutting:

Through the air within a radius of 20 miles around London for two hours a day there is transmitted a moving sound picture.

Its presence cannot be seen, heard, felt or even sensed by man unaided, but science has evolved a machine which can accurately transform a picture from electrical pulsations back into a replica of its original form.

Cameras and microphones situated at Alexandra Palace, the new home of British Television, are harnessed to mighty dynamos that provide the power for the throwing out into space of television programmes.

Britain has not been behind in realising the possibilities that this invention holds for the future, and on Monday night the first regular daily programmes were radiated from the Palace, proving that it is definitely out of the experimental stage.

I attended the demonstration of a G.E.C. televisor at Messrs Radio Rentals of the Radio Salon, Watford, and saw the first evening programme. I was astonished.

Vision and sound came through perfectly, but naturally it was the vision that amazed me most. It was just as if the picture was being thrown onto a screen by a film projector, so clear

These rather intriguing pictures and newspaper cutting have been hidden away for many years. They show a unique time in history when television was just emerging from science laboratories and into people's homes. As you gaze at these pictures you can only wonder at the sense of excitement, indeed the magic, that television must have conjured up within the hearts of those people as they first gathered round in the workshop to view the small silver screen for the first time.

Impressions on Television

Definitely Out of Experimental Stage

WATFORD FIRM'S ENTERPRISE

Through the air within a radius of twenty miles around London for two separate hours a day there is transmitted a moving sound picture.

Its presence cannot be seen, heard, felt or even sensed by man unaided, but science has evolved a machine which can accurately transform a picture from electrical pulsations back into a replica of its original form.

Cameras and microphones situated at Alexandra Palace, the new home of British Television, are harnessed to mighty dynamos that provide the power for the throwing out into space of television programmes.

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audio acts and interviews, and it was quite possible to imagine that I was actually a witness of the events which to all intents and purposes I was.

Lady Herbert, wife of Sir Dennis Herbert, M.P. for Watford, was present, and to the question of "How do you like it?" she replied "I like it very much."

"I never thought it would be so perfect," she added.

The directors of this firm who have shown such pioneering spirit are Messrs. J. H. Vaughan, G. Wilcox-Jones and J. B. Goodacre. Mr. Vaughan, by the way, has been in television from the start and he assisted Mr. Baird when he made his first television demonstration at the Crystal Palace about twelve years ago.

TECHNICALITIES

Mr. J. B. Goodacre is the technical expert at the Radio Salon, and from him I gleaned some very interesting facts.

The vision and sound are transmitted on two wave-lengths which are within a few tenths of a metre to each other, which on the seven metre waveband means a separation of a large number of kilocycles.

The two signals enter the set together by way of the same dipole aerial and are separated by one oscillator valve beating on the two frequencies.

The signals are then rectified and the right one is led to the loud-speaker and the other to the cathode ray tube.

The cathode ray tube represents the latest advance in television, and it supercedes the old scanning disc and motor which had to be synchronised with that at the transmitting end before a picture could be obtained.

The particular set in question cost 35 guineas, but at the same time it was perfectly evident that it could not become out of date for at least several years.

Anyone who wishes to see this latest wonder of a world full of wonders can do so at the Radio Salon, 85, The Parade, Watford, between 4 and 5 p.m., and by appointment between 8 and 10 p.m.

See page 4 for this firm's announcement.

—R.L.B.

BEECHES GROVE GUILD

"The Congo and Its People" was the subject of a lecture by the Rev. Robert Glennie, who spoke at a Beeches Grove Guild meeting on Tuesday.

Television.

Public Demonstrations, November 1936.



The particular set in question cost ninety-five Guineas, but at the same time it was perfectly evident that it could not become out of date for at least several years.

was it and so free from break or blemish.

Occasionally, just enough to make me realise more fully the wonder of the thing, flashes, similar to lightning, appeared on the screen, caused by atmospheric and interference emanating from a certain type of car ignition circuit from the main road. Sets erected at a fair distance from a main road would experience none of the latter interference, of course.

I saw the British Movietone News, a film depicting the birth of television, as well as studio acts and interviews, and it was quite possible to imagine that I was actually a witness of the events which to all intents and purposes I was.

Lady Herbert, wife of Sir Dennis Herbert, M.P. for Watford, was present and to the question of "How do you like it?" she voiced the opinion of those present – "Marvellous!"

"I never thought it would be so perfect," She added.

The directors of this firm who have shown such pioneering spirit are Messrs T.H. Vaughan, G. Wilcox-Jones and J.B. Goodacre. Mr. Vaughan, by the way, has been in television from the start and he assisted Mr Baird when he made his first television demonstration at the Crystal Palace about twelve years ago.

TECHNICALITIES

Mr J.B. Goodacre is the technical expert at the 'Radio Salon', and from him I gleaned some very interesting facts.

The vision and sound are transmitted on two wavelengths, which are within a few tenths of a metre to each other, which on the seven-metre waveband means a separation of a large number of Kilocycles.

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Baird press demonstration 1929

Text and transcript by Dave Newman; all other parts of this press pack courtesy of Bill Journeaux.

What you can see here is a unique account of a Baird press demonstration in Hammersmith late in 1929. All the items depicted are from an official press pack given before the event, which includes the official press invitation and press handout along with some publicity photographs for possible publication.

What is perhaps even more exciting are the hand written notes of the reporter. It appears that the report was due to be phoned from Victoria Station at 4.30 that afternoon for the next day's press. The notes give an engaging eyewitness account of this fascinating event. As the script is a little difficult to decipher I have included a transcript as it makes delightful reading.

The accompanying photographs depict the two televisors in striking Art Deco surroundings, as press reporters queue to catch a view of this new wonder of the 'modern' world. The studio with pianist and vocalist can be seen clearly to the left behind a soundproof glass screen. There is also an intriguing shot of the transmitting equipment.

This occasion was apparently a precursor to the coming Radio Olympia event, of which there are a couple of shots of the delightful 'period' GEC / Osram stand, along with the televisors they were currently manufacturing (see page 50).

A transcription of the reporters notes appears in the next column.

Victoria Station Wed 25/9/29

4.30 Phone

Television for the Home

Television has for all practical purposes reached a state of perfection. At a special demonstration given this afternoon at Kensington Mr. John L. Baird the inventor of the new science told an Exhibition Television Conference Representative that he had been working upon his invention since 1923, and had now brought it to a state where it can be applied to use in the homes of the people. "The Baird International Television Ltd" he said "are engaged in the manufacture of the sets and we shall be able shortly to supply them to the public. The Television cabinets contain both the wireless and the Television service. The combination will be of great interest to the "listener in" who will now also become a "looker in". At this afternoon's practical demonstration one was taken behind the scenes as it were and shown the interior of a Television Studio with a pianist accompanying the song of a vocalist, while adjoining the studio was the Control Room with all the necessary gadgets for conveying the face and voice to the "Television Set", so that while one saw and heard the singer or the speaker as the case might be, half a turn to the left showed exactly how it all was done. The demonstrations, it is understood, are being given in connection with the Wireless Exhibition at Olympia and in view of the forthcoming broadcast of Television from 2L-1 on the 30th. inst.

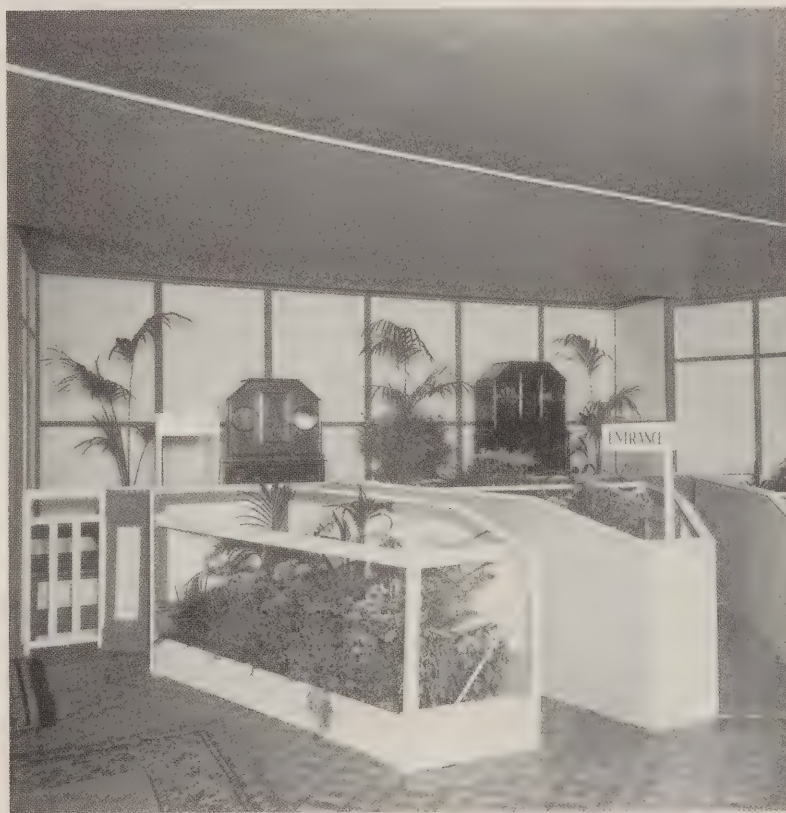
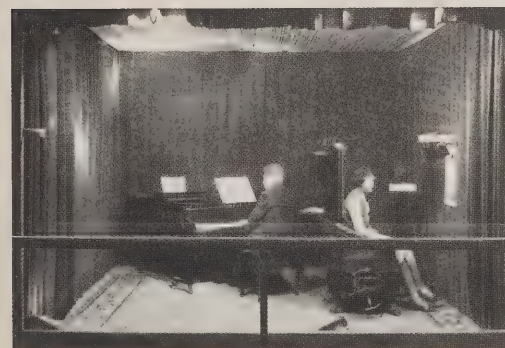
1. The demonstration was given at the GEC / Osram stand in the Exhibition Room at Victoria Station. The stand was a large, ornate, Art Deco structure, and the demonstration was given in a room with large windows. The demonstration was given by Mr. John L. Baird, the inventor of the new science. The demonstration was given in a room with large windows. The demonstration was given by Mr. John L. Baird, the inventor of the new science.

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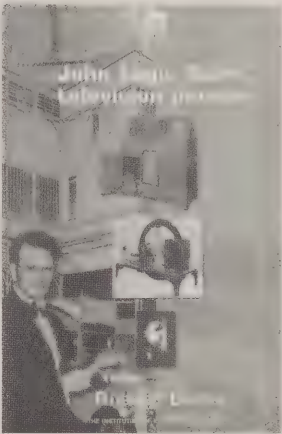
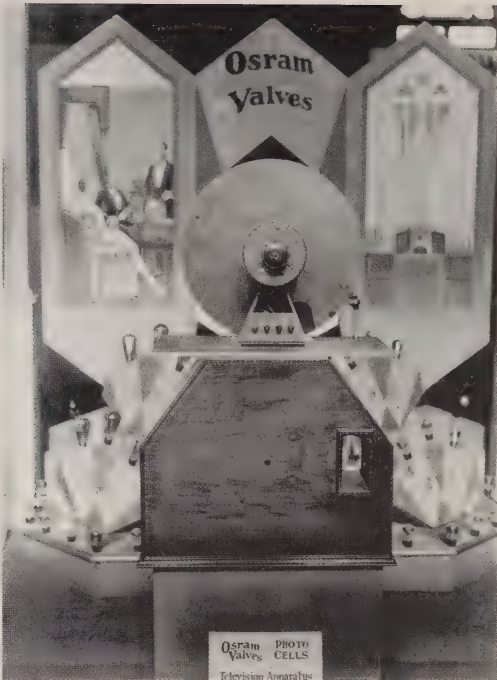
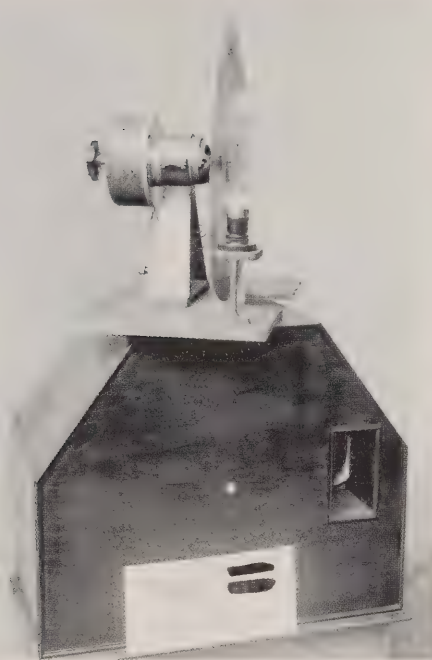


Although the Studio is placed in juxtaposition to the actual receiver, it must be pointed out that distance makes no difference, and transmissions by wireless can be accomplished over very great distances, and, in fact, has been carried out between London and New York.

Two "Televisors" are to be seen, and a smaller model is being exhibited on the General Electric Company's Stand at Olympia. This model will shortly be placed upon the market. It is not the intention of the Baird Company to manufacture these machines themselves, but to license various manufacturers who will go into production at the earliest possible moment. The first transmissions from B.I.C. will necessarily be of an experimental nature, and will enable experience to be gained as to the most suitable types of entertainment, etc. for television purposes.

In the meantime, the Baird Company, in order to meet immediate demands, have had manufactured a large supply of vital component parts of the "Televisors", so that there need be no delay in placing machines before the public.

Photographs taken at Radio Olympia 1929 showing the GEC / Osram stand, along with the televisions they were manufacturing at the time.



Book Review: John Logie Baird, television pioneer by Russell Burns

Institution of Electrical Engineers 2000 ISBN 0 85296 797 7
Hardback pp 420 £55 (discount to IEE members)

Basically there are few contemporary biographies about John Baird which have dealt with his life in such fine detail. This makes Professor Burn's book virtually unique. Perhaps the most significant achievement of this book is the skill used to knit together a workable narrative from so many disparate elements.

To support Baird's technical achievements, a complete British Patent list has also been included. From that list, generous space has been allocated to the most prominent inventions of 'Noctovision', 'Phonovision', Large-screen Television and Colour Television. To contrast the earliest achievements, a chapter has been included on Television development at the 'Bell Telephone Laboratories'. This deftly illustrates how much seemingly limitless financial outlay this company had expended to no great success, compared to how great Baird's achievements were with very limited resources.

Burns presents his story of Baird's life with often-sympathetic emphasis on the struggle between a man of

vision and the impassive face of conglomerate bureaucracy. Newly recovered documents add vigour to the text. For example, to depict how Baird could become inextricably tied to business protocol, Burns has deftly presented extracts of Baird's private correspondence; much of it previously unpublished.

A very positive and rewarding aspect of this book is that the fanciful elements often quoted in many previous works have been ignored and only solid facts are presented. This means that Burns does not speculate on whether the second 'Noctovision' process was a RADAR prototype, but identifies it as a direction finding tool which could not assess range. However to contrast that statement, I would liked to have read about Burns thoughts on Baird's earlier patent for the use of scanning combined with 'Hertzian waves'.

Facts are very significant in the Baird story as the seeds of publicity first sown by O. G. Hutchinson have clouded much of the past. I would, however, like to have seen the sometimes-dubious facts drawn from contemporary sources identified as such. The often quoted story of Baird procuring a human eye is virtually stated as fact and whilst it cannot be now proven as fact, probably illustrates Baird's humorous side. In another case, a section of the text describes the Thomascolour process (an American additive process which used a four element lens to create colour separations on monochrome 35mm film) which Baird hoped to adopt for Television use.

Burns quotes contemporary publicity 'where a 35mm frame is divided into three images and re-combined on the screen, we are certain that no loss of apparent definition will result.' This is not challenged in the text and warrants explanation in that, at the time, the definitive colour film expert Adrian Klein ridiculed Thomascolour. All additive colour processes of this nature (no matter which recording medium used) are

plagued by fringing and loss of definition, the point being that the publicity quoted was (and still is) unscientific and inaccurate. As far as the modern reader is concerned, this explains why this process was an extremely unfruitful avenue for Baird. It also explains by comparison, how the 'Telechrome' tube avoided the pitfalls of the cruder types of additive process.

In contrast to the contemporary reports which have been written, there are the difficulties of areas where there simply are no factual references. One of these areas is the possible constitution of the original light cell used by Baird. It is with great credit that Burns does an admirable job of explaining which type of cell would probably have been used. This is (to my knowledge) the first time that any author has attempted to detail the cell, aside from Ray Herbert's recent article on '75 Years of Television'.

Burns judiciously devotes a chapter to "Baird's personality" which is a useful way of identifying character traits which both helped and hindered Baird during his work on Television.

It is surprising that with all the detail covered by such meticulous research, there are only some minor errors. Some of these may have been introduced during the publishing process. For example, Fig 8.4 (a photograph of a 30 line Television demonstration) is dated as 1930, however Fig 15.7 is clearly from the same photograph session, but is now dated as 1933. Another minor issue is that of the cost of this book, which will be a deterrent to many. Even Public Libraries may be wary of the cost of this volume, which would be a great pity.

In summary, we have an admirable and definitive book which only serves to enrich the further deserved acceptance of Baird's achievements.

Andrew Henderson - Editor: '405 Alive'

A very positive and rewarding aspect of this book is that the fanciful elements often quoted in many previous works have been ignored and only solid facts are presented.

Book review

History of Telegraphy

by Ken Beauchamp,

Reviewed by Fons Vanden Berghen

When I first paged through this book, I was startled. I was myself gradually beginning to prepare to write another book after my Classics of Communication. But History of Telegraphy was exactly the book that I had imagined I would write. And then I very soon saw that I would never have reached the level Ken Beauchamp has achieved. So I put my own plans away.

Dr. Beauchamp did an extraordinary amount of research for this book and very often goes into details. This may well make the story sometimes long-winded for the average reader. Offsetting this disadvantage is that it is certainly not a superficial book, as so many are. Rather, it is one that digs deeply and brings up much new and interesting information.

The title of the book covers the contents, "history" has to be seen here in its broad sense. Presented are the history of the technology – from semaphore to satellite communication – the inventors and the industry, the applications and the users, the insertion into the social context of the time, and, very extensively, its applications in wartime (both on land, at sea, and in the air).

The telegraph landscape is seen mainly through British/American glasses. I noted only a few minor inaccuracies. The book is not cheap.

The book is well illustrated although the quality of the drawings and photographs (black & white) is not always at the highest standard. There are 112 of them in total (no single photograph of a Morseregister however) as

well as 21 tables.

Dr. Beauchamp, who also wrote Exhibiting Electricity (published by the IEE in 1997), unfortunately has passed away before the publication of his book.

In summary:

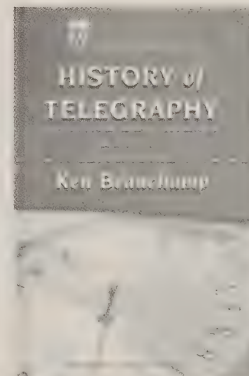
History of Telegraphy by Ken Beauchamp
Published by the IEE as No. 26 in the History of Technology Series in April 2001.
ISBN 0 85 296 7926 – 413 pages
Price: £55.00

Scope. This book records the growth of telegraphy over two centuries, depicting the discoveries and ingenuity of the experimenters and engineers involved, the equipment they designed and built, the organisation and applications they devised, and the effects on society. The two main phases – cable-based techniques that were launched early in the 19th century and then wireless transmission in the 20th – parallel the changes in voice and information communications of recent years.

Contents. Part 1: Terrestrial telegraphy: 1: Things mechanical; 2: Early electrical ideas; 3: Commercial telegraphy; 4: Military operations; 5: Submarine cables. Part 2: Aerial telegraphy: 6: Marconi and the experimenters; 7: Telegraphy for peace; 8: ...and at war; 9: Military telegraphy at sea; 10: Military telegraphy in the air; 11: Epilogue; Bibliography; Index.

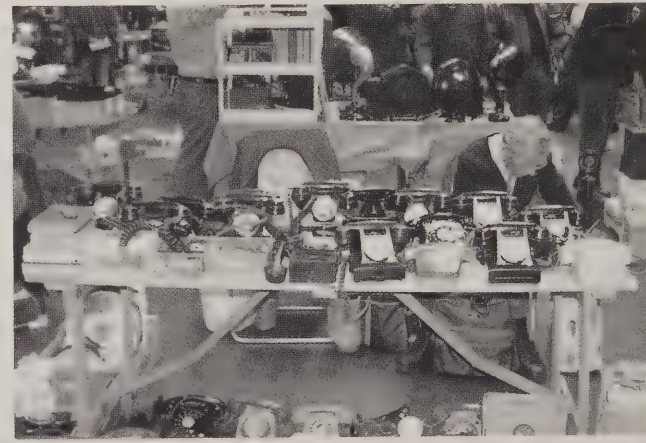
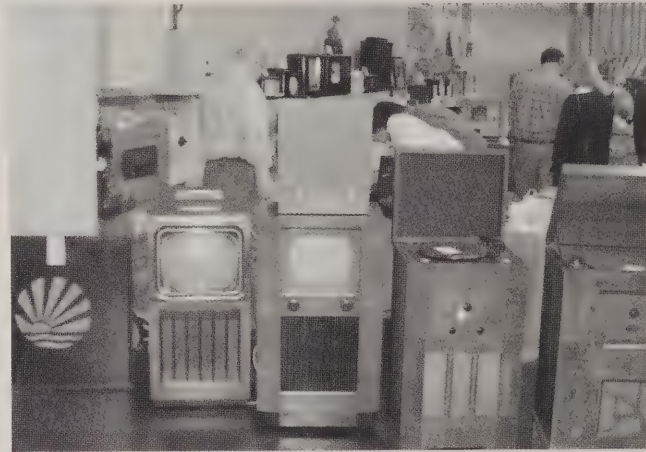
Readership. Historians of science, technology and communications, electrical and electronic engineers, students of the media

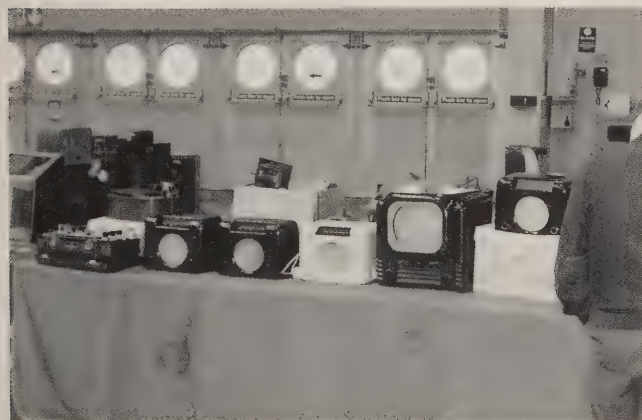
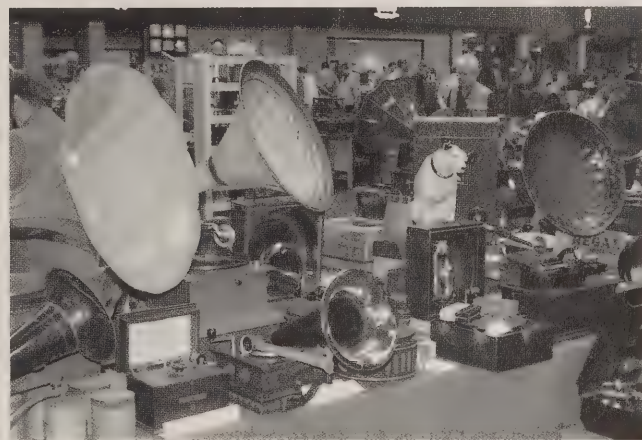
Level. Reference, professional



Images from the National Vintage Communications Fair Sunday 23rd September

Photographs by Terry Martini

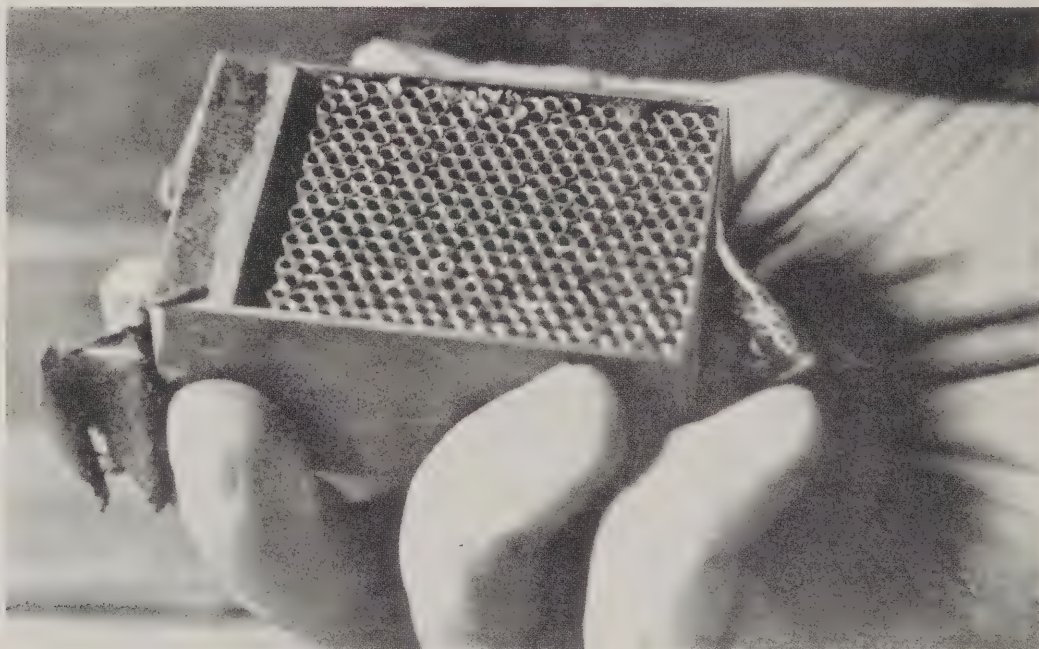
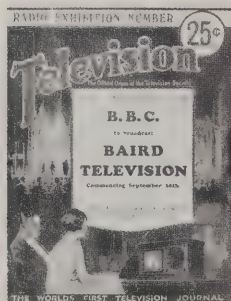
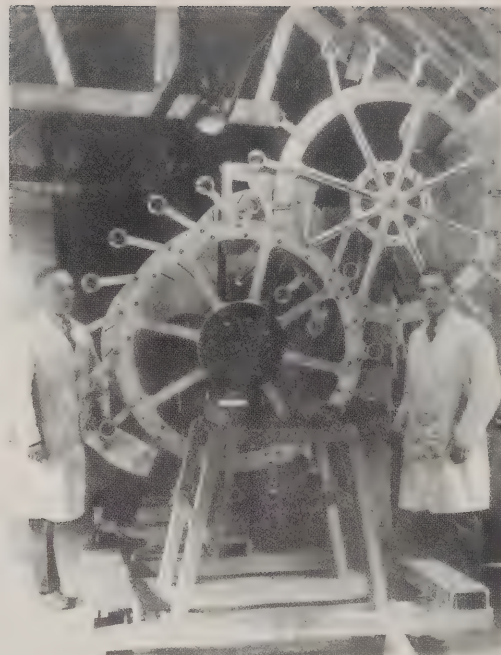




Unusual Scanning Devices

by Ray Herbert

The Nipkow scanning disc and the mirror drum have long been accepted as representing the classic components of mechanical television. There were other examples, of course, including the mirror screw, Jenkins' prisms and the Scophony cylindrical lenses. The mirror drum is nearly always attributed to Weiller, but it was, in fact, L.B. Atkinson, a student at King's College, London, who first used it seven years earlier, in his 1882 experiments. John Logie Baird made his own contribution to the list of novel scanning methods and as so little has appeared in print, it is worth while taking a closer look at these experiments.



Top right: Baird's modified optical lever at the works of B.J. Lines 1928.

Right: baird's honeycomb structure 1926.

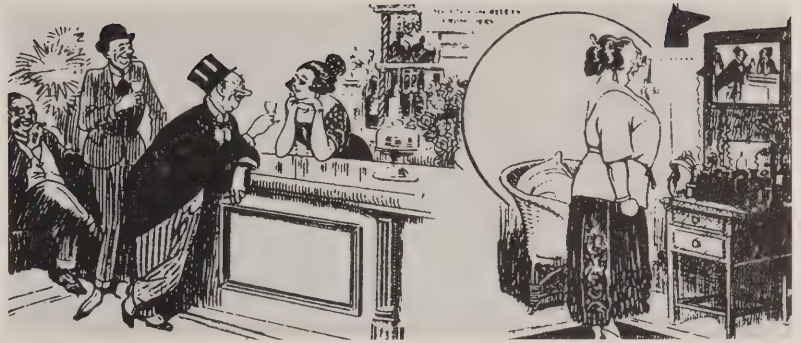
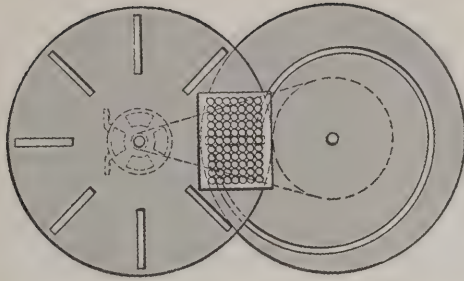
The Honeycomb Structure.

In a June 1926, issue of *Amateur Wireless* there appeared a photograph of O.G. Hutchinson (Baird's business manager) sitting beneath the floodlights in the Motograph House laboratory. Unfortunately, the reproduction was not sufficiently distinct to identify an interesting object to be seen in the scanning aperture. When a larger print became available it could be seen that this was the honeycomb structure used by Baird at that time and provided proof that a demonstration had been carried out. It consisted of a number of short, hollow tubes about 2 inches long with a bore of 0.1 inch, aligned in parallel rows.

An optical peculiarity of this arrangement is that there is no focal depth. An image passing through the honeycomb when formed on a screen will be the same size irrespective of the distance of projection. Baird used this device as a means of producing television images, not in the usual form of vertical or horizontal strips, but dot-by-dot as in newspaper

photographs, for example. The manner in which this was achieved can best be described by reference to the attached sketch.

Only the floodlight system could be used for this method, the subject to be televised being brilliantly illuminated and situated in front of the honey structure. Interposed between the photocell and the honeycomb block were two overlapping, rotating discs. One disc had a spiral slot revolving fairly slowly and this exposed successive layers of the hollow tubes to the photocell. The other rotated much faster and the radial slots ensured that only one tube at a time remained unobscured. At the receiving end, an exactly similar arrangement was used but with a neon lamp in place of the photocell. The image, consisting of spots of light of varying intensity, was displayed on a ground glass screen.



The Optical Lever.

Obtaining sufficient light for his insensitive photocells, coupled with the need to improve detail and reduce flicker, constantly occupied Baird's mind in the early days, but these objectives were largely incompatible. Better detail and increased light required larger lenses and more of them, resulting in bigger discs. Less flicker demanded greater rotational speeds but this increased the danger of the glass lenses becoming dislodged from the discs.

The optical lever represented an ingenious approach to this problem. Baird accepted that the speed of the shaft supporting the scanning disc had to be kept at a low level for safety reasons. He also realised that if it proved possible to scan an image that itself was moving at the same velocity as the disc, but in the opposite direction, the relative speed, one to the other, would effectively be doubled. This process could be repeated at will, each re-scan doubling the rate at which the image would eventually traverse the photocell, but without having to increase the speed of the mechanism.

No photographs of the complete optical have ever been seen. The illustration for this article was taken in 1928 at the works of B.J. Lynes Ltd, who built the mechanical assemblies for the Baird Company. There are two parallel shafts, so spaced that the lenses on the scanning discs overlap. Each disc has 20 lenses in a single spiral, and they rotate in opposite directions. The arrangement shown differs from the patent (No 265,640), since there is an additional large disc on each shaft having multiple spiral slots. The apparatus in the photograph is incomplete - there are no motors connected to the shafts and the final disc and photocell are not included. It is not clear why Baird chose a definition of 20 lines for these experiments, which involve that number of lenses. At that time, 30 lines had been adopted as the standard. Although equipment of this type was installed in the Long Acre laboratories, none of the staff could recall having seen it and no demonstrations were reported in the press.

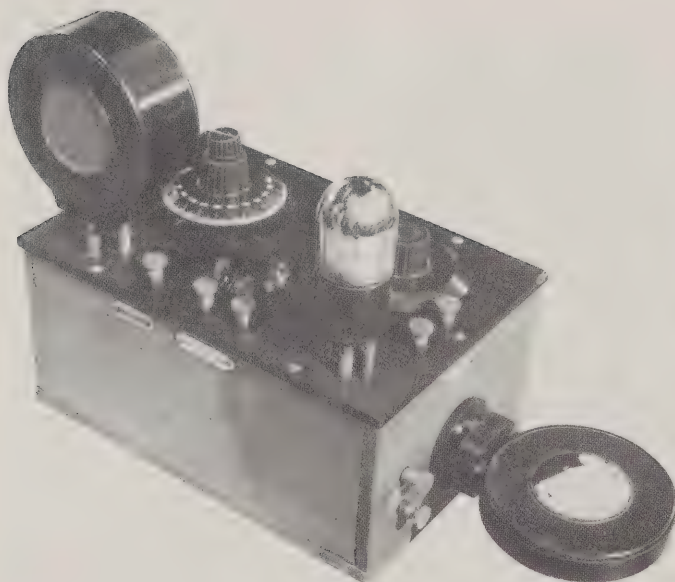
Above: Baird engineer Arthur Thynne checking picture on a monitor receiver.

A nineteen-twenties Ducretet superhet converter

by Ian Higginbottom

As we shall see, this rather ungainly-looking accessory is matched by an ungainly performance. In the BVWS Bulletin Vol. 6 No. 2 for September 1981 I described a 5-valve superhet by Ducretet of Paris in which, as here, the chief technical feature of historical interest is the use of a single-valve frequency-changer, avoiding the use of the separate oscillator valve that was usual at this time (about 1926/28). This was achieved with a special bigrid ("hétérodyne") valve resembling the slightly earlier space-charge tetrodes that were the basis of the Unidyne receiver. The term bigrid is perhaps more appropriate in the present case where both grids were worked nominally at the same (earth) potential. The signal is fed to the outer grid, the inner grid and anode being inductively coupled to act as the local oscillator. The resulting output at the intermediate frequency, nominally 75kHz (4000m), was fed to the aerial terminal of a conventional TRF receiver, assuming it could tune to this range.

Ducretet used the 4-volt bigrid R43, made by Dario. This had a 5-pin base resembling the Franco-British B5 type, but with the pins arranged round a larger circle of 22mm diameter. The centre pin was the anode, the inner and outer grids being taken respectively to analogues of the anode and grid pins of the B5 base. Now for the ungainly performance already mentioned. Besides acting as local oscillator, the bigrid has also to function as first detector and the two rôles are not strictly compatible. As the result, a flat-topped waveform is generated, rather than a pure sine-wave and bigrid frequency-changers accordingly were prolific creators of harmonics. Images of the same broadcast could be tuned-in at several places on the dial, separated by multiples of the intermediate frequency. Thus, the selectivity that was normally one of the decisive advantages of the superhet at this early date was largely nullified.



About the CD

By Terry Martini

The CD that is enclosed with this issue contains a complete set of back issue BVWS bulletins, supplements, where available, and indexes spanning volumes 1 to 20. The project was three fold. First by archiving these important documents onto CD into the universal adobe Portable Document Format (PDF) it served as a good way to preserve permanently, part of the Societies history. Secondly, as it is also the BVWS's 25th anniversary year it seemed a fitting way in which to issue a CD in this form, and finally, as a large proportion of the earlier issues had a very small print run probably, just a couple of hundred in the early days as opposed to the two thousand odd that are printed now, stocks of these have been exhausted for many years. This therefore, is an ideal way for members to have all of these early bulletins at their fingertips for reference.

The earliest issues were duplicated on one of the first commercially available Xerox photocopiers on double side A4 paper. Even so the quality is acceptable and shows the high standard that was achieved by the founder members in the early days of the Society. The later issues were in an A4 magazine style of the type of which we are most familiar with today, appearing first with a buff-covered front cover, then moving onto a glossy cover. The early volumes contain 4 issues a year moving up to 6 issues in the later volumes. Many of the early covers were profusely illustrated with the superb Norman Jackson drawings, which

have reproduced very well on screen. Print quality also improved in the later issues with the move to offset litho. I have attempted to strike a balance to preserve as much as possible the original documents, such as the early colour covers and odd special colour insert, but at the same time in keeping the file size of each document within manageable proportions. Each issue has been tidied up and screen-optimised, however should you wish to print an issue off, the results should be acceptable from a laser or inkjet printer.

I believe that we are one of the first membership-based organisations to archive and issue on a complimentary CD, such a comprehensive range of documents in an accessible electronic form to the membership as a whole. I very much hope that you will find the CD a useful resource and welcome your comments.

The project took about nine months in total for me to complete. None of the original documents were available in an electronic form to start with, except Volume 20, which is the year our current editor, Carl Glover took over. I could not have completed such a mammoth project on my own, and I am indebted to the following people for their help. Paul Stenning – for designing the PDF browser and for the "Adobe" advice, Gerald Wells – for allowing me access to the Vintage Wireless Museum archives for bulletin scanning and Ian Higginbottom – for filling in the Bulletin gaps from his own personal archive.



Book review

"Tickling the Crystal" by Ian L. Sanders - reviewed by Jonathan Hill.

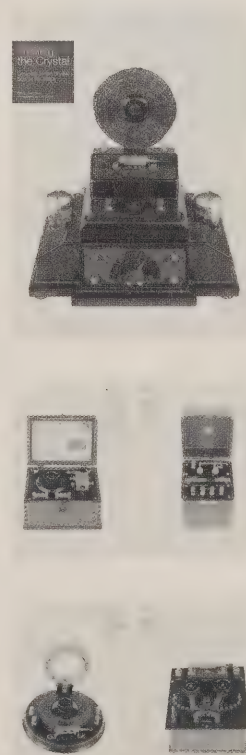
To say that we have waited decades for a second book on British crystal sets isn't an over-statement as it was as long ago as the mid-1970s that Gordon Bussey's short, but ground breaking work on the subject ("Vintage Crystal Sets, 1922-1927") was published. How our hearts pounded when we looked at all those sets for the first time!

Now, twenty five years on, author Ian L. Sanders has produced a truly exciting world-class reference book covering just about every aspect of British domestic crystal sets of the 1920s. Heavily illustrated throughout with hundreds of photographs specially taken by Carl Glover, (and with enough text and information to keep you quiet during several stints of bedtime reading), the book has at its core a 173 page photographic A to Z directory. Here you will find glorious full-page b&w and colour photos of crystal sets ranging from the little Abbiphone by Abbey Industries of SE2, to the Yorkshire Radio Company's "Spotter" - many never seen before, let alone described. Each set here is accompanied by a clear and concise caption (I love these captions!) noting maker, model, year of manufacture, construction, tuning arrangement, detector and original price, plus other interesting little snippets and comments. Featured as well in this section, are many sets of unknown origin - the "Carlton", the "Apex", and the odd-sounding "Jay-Nay", plus several home-made examples - an area I am pleased to see that Ian has not neglected.

Preceding this is a well-written twelve chapter section which gives you a real understanding of what it must have been like to listen-in during the crystal set era, what sort of equipment you would have used, and the circuits and components that went to make up your crystal set. This section is just crammed with an assortment of fabulous photos. For example, the chapter covering detectors has no less than 74 photos and illustrations showing the author's wonderful collection of detectors, cat's whiskers, crystal tins and crystals etc., and all contained in just 6 pages - here is someone who has set out to specialise in a subject and how he loves his subject!

Towards the end of the book, the appendices are full of interesting and useful information about the manufacturers themselves, all the models they were known to have produced, the brand names that were used, the crystals and minerals found in detectors, circuit diagrams, headphones, and note magnifiers. In addition, Ian has published the list of P.O. Registration Numbers, painstakingly put together by the likes of Tony Constable, Mike Field, Pat Leggatt, Martyn Bennett and various other members of the BVWS over many, many years, but not specifically acknowledged here as such - my one and only gripe in an otherwise perfect book! All in all, 256 pages of absolute delight!

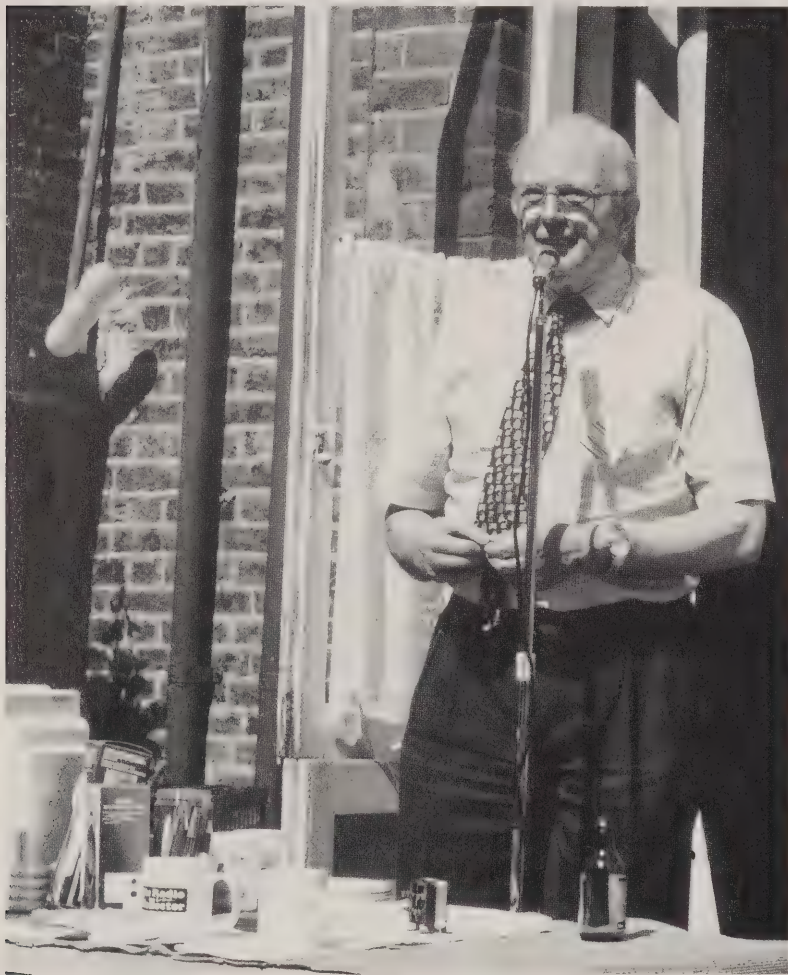
"Tickling the Crystal" by Ian L. Sanders is published by Bentomel Books, Finchcroft, Tunbridge Wells, Kent TN2 5PE Telephone 01892 543505 email: bentomelbooks@aol.com price £29.95p plus £7.00 p&p in the UK/EEC and £14.00 for the rest of the world. ISBN 0-9541372-0-5.



Extract from 'Obsession'

by Gerry wells.

"I can understand your obsession with radio, but what is so special about EMI?" Question from a visitor after seeing rows of HMV - The date: late 90's



Above: Gerry entertaining guests at his Summer 2000 garden party.

CHAPTER FIFTY-TWO

Some visitors may think that they can understand my obsession for radio, but I am sure I can't.

I suppose my love for EMI products must have started when I spent a few weeks at their service department at Perivale in the fifties. At that time all their pre-war televisions had been recalled so that they could have all their condensers changed. This was a good move on the part of EMI, it was a free service and meant that all their sets that had been sold between 1936 and 1939 could give a few more years of good service.

The sets that come to mind were the HMV 900, a combined radio and 12-inch mirror lid TV. It was designed to receive the 405-line system as well as the Baird 240 line. They must have been the first ones made. We have the original at the museum. It was presented to Lord Selsdon, the then Post Master General, in appreciation for helping to steer the television Bill through parliament, after all we didn't want the same trouble as we had in 1922 when we wanted to get radio started. This set had been kept at a Post Office museum after Lord Selsdon died in 1951. The Post Office felt that as it wasn't a telephone it might be more appropriate for it to be displayed at the Vintage Wireless Museum. I

think that we got it in 1983. We were able to get a picture on it and the last time we watched it was in 1985 to witness the closing down of the 405-line system. In Jonathan Hills's book 'The History of the BVWS' is a picture of myself and a few members toasting the closing of 405.

I don't know how many HMV 900s or their Marconi equivalents were manufactured but I think it could only have been about a thousand at the most. Bearing in mind that there were only eighteen thousand television sets made before the war. There were only about nine manufacturers involved at that time. As a conservative estimate I would say that only about 300 survive to this day, we have seven at the museum.

The model 900 sold for around Ninety pounds, this was a great deal of money. It was large, one metre high, one metre wide and half a metre in depth; it weighed over 100 kg. It could only be used in the south east of England; the transmitter was at Alexandra Palace in North London and radiated a power of seventeen and a half kilowatts. You could just about receive it in Brighton if you had a four element Aerial and the wind behind you.

The programmes were fairly highbrow and of short duration. Most afternoons there would be a programme called Picture Page, a magazine programme that was rather like 'In town tonight' with pictures. The BBC certainly knew how to pick the best possible people as presenters and interviewers to bring some of the more boring people that were around to come before the cameras. Picture page was usually followed by a cartoon and then the latest edition of British Movietone News. The service then shut down until eight o'clock in the evening. The evening programmes were certainly very good, even if they were more cultural than the afternoon efforts. We were treated to West End shows as well as leading sporting events.

Not everyone could afford these very large sets. The EMI group put out a series of small screen sets at a fraction of the price; these sets were the HMV 707 and HMV 705. They were table models with either Seven or Five-inch screens, both models incorporated a first class radio. They sold for thirty-one pounds for the Seven-inch model and twenty-nine pounds for the Five-inch. I believe they made five hundred of each. I think these sets must have been subsidised by EMI because they were very worried that this new electronic miracle might not take off.

Another aspect that came to mind at that time was the increasing possibility of war with Nazi Germany. This would of course mean that our television service would have to close down for the duration as the TV wavelength would be needed for Radar.

EMI felt that if the TV service shut down at least you would have a first class radio. The EMI Company produced about eight different models during the Thirties. The biggest was the 903, this incorporated a K3 record changer and eleven of these were made.

Our biggest TV is the RGD 1937 model; it is a combined Radio/Gram/TV with a mirror in the lid. A lot of the large screen TVs had to be viewed through a mirror in the lid as the cathode ray tubes were twenty-seven inches long and if they were laid flat in the conventional way you would not have got them through the door.

This set was given to us by Sir Paul Getty. It belonged to his father, Paul Getty Senior. It was installed at Sutton Place.

A couple of years ago I had a phone call from a very old man down at Crowborough. He told me he had a television set that he wanted to dispose of, he told me that he remembered his father buying it in April 1936, it was a Cossor and very large. He said it was a model 137, I told him that it was right out of my league and that he should put it into Christie's as they are used to very rare pieces.

He got in touch with Christie's and they went down to Crowborough to look at it. They took one look at it and

said, "We are not going to let that set anywhere near our nice pieces of furniture at the auction rooms, it is only the woodworm holding hands that are keeping it together. I received a further phone call from the elderly gentleman stating that he was going into sheltered accommodation in two days and if I would like the set I could have it for nothing, but I would have to go down there very quickly. I phoned up a close friend who has a removal business, he went down there immediately with helpers and got it back here for me. It was very heavy. They had to put it down for a rest outside the workshop doors but when they picked it up again to put it in the workshop they left behind a pile of woodworm dust two foot by two foot. The mark stayed on the path for weeks.

I dismantled the set as quickly as possible. I put all the cabinet parts in a huge plastic sack, sprinkled liberally with Rentokil I put it out in the garden in the hot sunlight, I didn't want it to eat the sheds. I then had a good look at the chassis, I found that it was serial No 2, it had a lot of previous convictions. It had three mains transformers, two of which were burnt out, every single condenser had to be changed and the long wave oscillator coil had been attacked with green spot. The tube was original and looked as if it had had very little use.

This is often the case with early televisions as they have spent more time in the repair shop than they have in the home, so the tube doesn't get a lot of use. The cabinet had to be completely re-built, this was the biggest part of the job, when it was put together it gave a very good account of itself. The set was sold to David Boynes for a good price as we needed the money and we hadn't got the space to keep it.

The 1936 Corsor was fun, but the next adventure was an HMV 900. It wasn't fun in fact it was a nightmare.

I got a phone call from a 'hippie' late one evening he said "like, I've got this old Telly" I said "what kind is it and how much?" he replied "my grandfather got it in 1936 and he gave it to me in 1985 it is an HMV", he suggested a price that I found acceptable. The big problem was collecting it. My friend Andrew has an open back truck and as the set was only over at Tooting he agreed to help me collect it. We set off on a cold February morning to this derelict garage at the end of a mud path.

The poor old 900 was in a sad state; the veneer was peeling off, the speaker grille had been stoved in and the set was half buried under old motor cycle parts and Pink Floyd record sleeves.

However it was complete.

I think this model must weigh about 3cwt We got it out the garage and dragged it through the mud to the truck; it took Andrew, Hippie and myself all our strength to get it onto the truck.

We got it back to Dulwich. The next job was to get it off the truck, by this time bits had started to fall off. Eileen came out to help us unload it onto our trolley when she remarked that a piece of wire was hanging out of the bottom of the cabinet, I pulled it out to find it was the tail of a dead rat.

We got it into the biggest workshop and placed it in the middle of the floor. I took the back off and had a good look, rats had made a home in the bottom of the cabinet and had totally destroyed the power supply chassis, the remains of which were held in with rusted bolts. I had a close look at the other chassis and they all seemed to be in reasonable condition.

The tube and all the valves seemed to be in a good state. I was delighted to find that this set was serial number 6 and that it still had all the parts for the Baird 240-line system. The set had the same smell as a council estate lift.

After a good scrub and a strong drink I tackled the job of dismantling. There was no sign of woodworm (maybe the rats had driven them away). As all the parts were removed they were placed out in the garden; I then switched on 'Edward the compressor' (sometimes known as Monica) and blew out all the muck with the 150-lb. PSI airline.

I also use the same device to deal with woodworm. I place the nozzle over a likely looking hole and watch the worm and the dust being fired at high speed. Once everything has been stripped down and cleaned, I then put all the internal parts to one side and tackled the cabinet. I stripped off all the old polish and re-glued all the veneers that had lifted and re-fitted bits that had fallen off en route. The case was then handed to Geoff to re-polish. I shall never fail to be amazed at the quality of the veneers that EMI used in their products; this set was no exception. I think that it is one of the prettiest sets I have ever seen

The inner workings were not too difficult, making a new power chassis was fairly easy and all I had to do was change the condensers on the other chassis. When it was all wired up on the test bench I plugged it in and switched on, I shall never fail to be amazed at the quality of the soft low hum from the loud speaker, followed by the high pitched whistle so beloved by television engineers. Hooray the tube was good, in fact it was like new but all I got was a white line across the screen. This meant that the frame time base had collapsed.

On a closer examination I discovered that the frame blocking oscillator transformer had gone open circuit, I removed it, it is quite small, about two-inches high and one and a half inches wide. The transformer is placed inside a metal pot and filled with tar, I had to heat it up with a blowlamp to melt the tar so that I could remove it for re-winding. Once I had removed the laminations I then had to count the turns as I unwound it on the winding machine. It is wound with forty-four gauge wire (slightly thicker than hair) it had seven thousand turns. It took me two days to re-wind.

I put it back in the set, a perfect picture was restored, when it was all put back in its case it looked truly wonderful.

I could not keep it at the museum as I already had one but I sold it within a few days for a very good price to a friend down on the south coast. He has one of Dave Grant's standards converters so he can watch it regularly.

Large HMV products are like buses, you wait a long time for one and then three turn up in quick succession. No sooner had I finished the 900 T.V. than Neil Mason turned up with two model 800 Radiograms. Neither of them were complete but he felt that with my help and workshop he could make a good one out of the two. After a week's hard work we made a good one. After everything was paid for he took both sets away, every last nut, screw and parts of the spare set. I felt a bit peeved because I felt that he could at least have given me all the bits that were left over.

A year later he returned with a small Pye record player for me to fix. I repaired it for him and when he asked me how much? I replied "Give me all the bits of the 800 that you have left over," he liked the idea and came over the following Sunday with all the parts, cabinet etc wrapped up in brown paper and tied up with string.

I laid out all the parts that he had brought over on the benches and made a list of everything that was missing. The cabinet was very nice but the black plinth was missing; it had been eaten by worm many years ago, the escutcheon plates were also missing, as were the knobs and all the fixing screws. The K3 record changer and its counter balance pick up had also disappeared along with the power supply and speakers. I had enough to make a start. I took mouldings and drawings of the museum 800 and proceeded to make all the missing parts. I had five K3 changers in the stores all incomplete and minus pickups. I managed to make one good one out of the five and made a fibre glass copy of the pick up arm. When it was finished the Evans family at Liss took a fancy to it. I didn't think I would have it for long.

A few weeks ago a box full of old parts turned up from somebody that was having a clear out, in a tin at the bottom of the box were all the missing knobs and screws that were needed for the 800. If only I had waited for a few months I could have saved myself a lot of hard work.

The poor old 900 was in a sad state; the veneer was peeling off, the speaker grill had been stoved in and the set was half buried under old motor cycle parts and Pink Floyd record sleeves.

Letters

Dear Editor

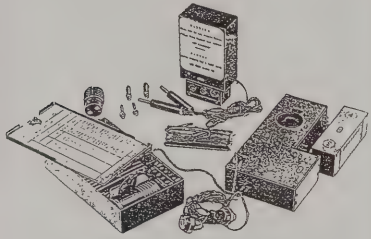
In the Autumn 2001 Bulletin Mike Barker gently skims over the enormous amount of work he put into his Murphy V134/6 TV. He mentioned replacement Visconol EHT capacitors. These are now a definite liability. My experience suggests that if you replace one with "new old stock" it will probably fail in a very short period. Beware if you decide to rebuild a Visconol capacitor by replacing the old innards with a modern component. The oil is reputed to be of the toxic PCB (polychloro-biphenyl) type which is not good for you or the environment when you wash it down the drain.

Mike, aren't you glad you found some original ceramic tube capacitors!

Jeffrey Borinsky

(and the Mt. JOLIF unit for d.c. Power Supply)

Equipment.	Size.	Weight.
Mt. JOL Receiver	6.5/16" x 5.5/16" x 1 1/2"	2 1/2 lbs.
Mt. JOL Battery Box	6.5/16" x 5.5/16" x 1 1/2"	2 1/2 lbs.
Mt. JOLIF Power Supply Unit	5" x 2 1/2" x 1 1/2"	1 1/2 lbs.



The battery box contains the following ancillary equipment:-

- "Deaf Aid" type Earphones, (2)
- T Cord for Earphones.
- Earth lead fitted with plug and clip, 10 ft.
- Aerial fitted with plug and sluglet insulator, 50 ft.
- Extra battery lead assembly, 6 ft.
- L.F. Battery, U.2 Type.
- H.F. Battery, B101 Type.

The Mt. JOLIF ancillary bag contains:-

- Universal mains adaptor.
- Fuse, 2 amp (4)
- Screwdriver
- Spare screws (6)

Dear Editor

I enjoyed reading the latest Bulletin (vol 26, No 3, Autumn 2001) but was baffled by page 18.

For some years I have owned a set which is clearly the second from the bottom on that page. I believe it to be an R301, based not only on information from other collectors but also from published data. As an example of the latter I enclose a copy of a page from a manual. This is clearly not only my set but also that shown second from bottom on page 18.

Have the captions on that page been transposed?

Yours sincerely
RGA Youard

Editor replies: Yes they have been transposed.

Even though the Bulletin has three proofreaders before it goes to print and most articles above two pages are checked by their authors (as this one was) the odd mistake creeps through, and this was one of them.

Dear Editor

With the current stringent regulations regarding electrical safety, where do we stand when we repair or sell a refurbished wireless? I'm thinking not only of non-isolated chassis sets, but also of transformer types. It is unlikely old insulation would sustain present test voltages, and non-isolated sets can have live metalwork if the rear 2 pole connector is wrongly inserted. Any comments you can give on this subject would be very welcome.

Regards
Colin Boggis

Dear Editor

The BTH set which Colin M. Reynolds requested information about in Bulletin Vol 22, No.2 would appear not to be the set shown on page 73 of Radio Radio (as in Phil Rosen's letter) but the one shown on page 83 as this is the VR2 Form BA.

I have one of these sets (serial no. R73449) which has the usual grid-leak detector transformer coupled to a LF stage circuit, with plug-in tuning coils. The set is quite well made



Sold by all good Radio Dealers

with good screening and works well. The transformer windings are ok, not o/c as most transformers from the period seem to be. The labels on the battery leads give the detector anode voltage as +90v with grid bias. The set caters for either bright or dull emitter valves so many valves of the 1925 period would be suitable for it.

I enclose an advertisement from Popular Wireless of October 9th, 1926 (see top of page) showing the receiver with two BTH valves, the output valve having a top pip - possibly these were a BTH B5 (detector) and B6 (output).

Moving on to the subject of clandestine radios in Vol 26 no.3, could the paraset illustrated have been made by Bush radio as the valve holders and serial number label look the same as the types used by Bush. Does anyone know?

Mike Butt

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Back issues

Vol 10 Numbers 2, 3 & 4 Inc. The KB Masterpiece, Extinct Species "A Monster Defiant".

Vol 11 Numbers 1, 2, 3, 4 Inc. BTH VR3 (1924) receiver, Marconi's 1897 tests, Origin of the term 'Radio', Baird or Jenkins first with TV?

Vol 12 Numbers 1, 2, 3, 4 Inc. the Emor Globe, The Fultograph, Ekco Coloured Cabinets.

Vol 13 Numbers 1, 2, 3 Inc. Direct action tuning, The Philips 2514, Noctovision.

Vol 14 Numbers 1, 2, 3, 4 Inc. Cable broadcasting in the 1930's, The story of the Screen Grid.

Vol 15 Numbers 2, 3, 4 Inc. The

wartime Civilian Receiver, Coherers in action, Vintage Vision.

Vol 16 Numbers 1, 2, 3, 4 Inc. The Stenode, The Philips 2511, Inside the Round Ekcos.

Vol 17 Numbers 1, 3, 4, 5, 6 Inc. Wattless Mains Droppers, The First Philips set, Receiver Techniques.

Vol 18 Numbers 3, 4, 5 Inc. The First Transistor radio, The AVO Valve tester, The way it was.

Vol 19 Numbers 1, 2, 3, 4, 5, 6 Inc. The Birth of the Transistor, Super Inductance and all that, reflex circuits, A Murphy Radio display, restoration.

Vol 20 Numbers 1, 2, 4, 5, 6 Inc. Radio Instruments Ltd., Japanese shirt pocket radios, Philco 'peoples set', notes on piano-keys, the story

of Pilot Radio, the Ever Ready company from the inside, the Cambridge international, the AWA Radiolette, this Murphy tunes itself!

Vol 21 Numbers 1, 2, 3, 4 Inc. Marconi in postcards, the Defiant M900, GPO registration No.s, Personal portables, the transmission of time signals by wireless, the Ekco A23, historic equipment from the early marine era, the birth pains of radio, inside the BM20, plastics, Ferdinand Braun, pioneer of wireless telegraphy, that was the weekend that was, the first bakelite radios, BWWS - the first five years, the world of cathedrals, Pam 710.

Vol 22 Numbers 1, 2, 3, 4 Inc. Another AD65 story, the Marconiphone P20B & P17B, listening in, communication with wires, the story of Sudbury radio supply, French collection, Zenith Trans-oceanics, Farnham show, Alba's baby, the first Murphy television receiver, AJS receivers, Fellows magneto Company, Ekco RS3, Black Propaganda.

Vol 23 Numbers 1, 2, 3, 4 Inc. Sonora Sonorette, Bush SUG3, RNAS Transmitter type 52b, North American 'Woodies', Why collect catalin, Pilot Little Maestro, Theremin or Electronde, The Radio Communication Company, Early FM receivers, an odd Melody Maker, Black propaganda.

Vol 24 Numbers 1, 2, 3, 4 Inc. The Superhet for beginners, Triode valves in radio receivers, History of GEC and the Marconi - Osram valve, KB FB10,

Great Scotts!, Riders manuals.

Vol 25 Numbers 1, 2, 3, 4 Inc. Repair of an Aerodyne 302, Henry Jackson, pioneer of Wireless communication at sea, Zenith 500 series, Confessions of a wireless fiend, RGD B2351, John Bailey 1938 Alexandra palace and the BBC, Ekco during the phony war, Repairing a BTH loudspeaker, The portable radio in British life.

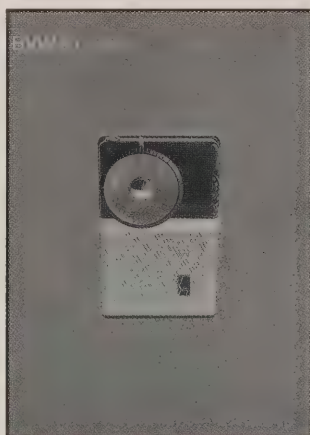
Vol 26 Numbers 1, 2 Inc. How green was your Ekco?, The Amplion Dragon, Crystal gazing, The BVWS at the NEC, Installing aerials and earths, novelty radios, Machine-age Ekco stands of the 1930s, Volksempfänger; myth and reality.

Supplements:

- 1 'The story of Burndept'.
- 2 'WW 1927 data sheet'
- 3 'Seeing by wireless' the story of Baird Television
- 4 Reproduction Marconi catalogue

Earlier Bulletins and supplements are priced at £2:00 each + postage. Bulletins from volume 21 onwards are priced at £2.50 each. + postage.

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News and Meetings

The keeper of the list

Martyn Bennett still has the role of custodian of the BVWS list of G.P.O. Registration Numbers. As many members will know the project of assembling this list was started in the early days of the BVWS and, more recently, has been enthusiastically carried on by Pat Leggatt. Members are strongly urged to help build the list, whenever they get the opportunity, particularly as it is something that will help with the identification of vintage wireless in years to come. The list is by no means complete and the GPO no longer have a record of the numbers granted to wireless manufacturers. The BVWS Handbook contains the current listings - one in numerical order and one ordered by name. Please let Martyn have any additions, or suggestions for corrections, by mail or over the phone.



Contact address:

Martyn Bennett, 58 Church Road, Fleet, Hampshire GU13 8LB
telephone: 01252-613660
e-mail: martyB@globalnet.co.uk



Newcomen Society Lecture by Dr. Anthony Constable

Marconi's Transatlantic Wireless Message, 1901:

The Emergence of a New Technology. Time & Date: **5.45 p.m. on 12 December 2001**. Venue: Royal Entomological Society 41, Queens Gate, London, SW7. This lecture will review the equipment developments which took place from 1888 to Marconi's successful transatlantic message on 12th December 1901.

Harpenden meetings 2002

Auction AGM **3rd March 2002**, Swapmeet **9th June 2002**, Swapmeet **1st September 2002** (featuring 'Talking About Wireless' lectures in the small hall), Swapmeet **24th November 2002**.

Harpenden meetings 2003

AGM / Auction **2nd March 2003**, June Swapmeet **8th June 2003**, September Swapmeet **7th September 2003**, November Swapmeet **23rd November 2003**

Ashurst, Hampshire Swapmeet 2002

Due to the successful Lyndhurst swapmeet earlier this year there will now be one at Colbury Hall, Nr Ashurst Hampshire on **Sunday May 19th 2002**. For further details concerning this swapmeet please contact Sam Turner on 0238 0292374.

Gerald Wells' garden party 2002

Gerald will be hosting his garden party on **Saturday 8th June 2002**.

NVCF 2002

Forewarned is forearmed, next years NVCF meetings will be on Sunday **5th May** and **Sunday 15th September** (date changed due to clash with the Ryder Cup). See advert on page 2.

New Articles

If you have anything interesting to say concerning Wireless, Television, Broadcasting, Collecting etc, please send it to the Editor for future publication in the BVWS Bulletin. Your article can be just a few paragraphs long if you think it conveys its message to your fellow members. Also if you have any photographic material that would look good in the Bulletin, don't hesitate to post it to the Editor. The chances are that I will definitely use it!

Please send to: Carl Glover, 33 Rangers Square, London SE10 8HR.
Tel: 020 8469 2904 email: choris.b@virgin.net

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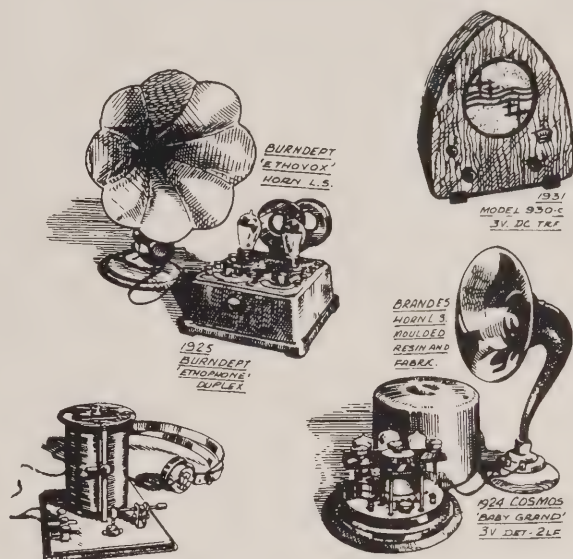
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MEMBERS' ADVERTISEMENTS

[Issued with BVWS Bulletin Vol.26 No.4]

Adverts are free to Members but the Society is not responsible for descriptions given or any subsequent transactions. Where firm prices are quoted vendors must not accept competitive higher offers. Be concise and use our normal style and format. State whether postal/E-mail address or only phone or fax no. should be used. Send adverts (only radio/TV-related items) to Ian Higginbottom, 5 Templewood, London W13 8BA or fax to 020 8998 1594.

WANTED: Pye P160 PQ 1959 pocket portable (R.R. Fig.799) for sentimental reasons! Ian Aizlewood, Tel. 01582 391552 home or 01582 424233 work.

WANTED: Loudspeaker and o/p transformer for Bush AC91, as also used in original Bush DAC 90 (not 90A). Also backs for DAC90 (1946) and Philips 834A (1933). **FOR SALE:** Bush DAC90A receiver £45. Mike Horne, 100 Cockshott Lane, Leeds LS12 2RQ. Tel. 01132 638504.

WANTED: Either a Gecophone HiFlux 3:1 LF transformer BC710 as used in Osram Four New Music Magnet or someone who can rewind o/c secondary of above. James Bence, 5 Braeside Gardens, Hamilton, South Lanarkshire ML3 7PN. Tel. 01698 427484.

FOR SALE: A.T.M. Co. Telegraph Relay in cylindrical brass case with hinged glass top and 7 knurled terminals on circular wooden base, £35. Marconi S625 S.G. valve, fil. OK, in tatty original box, £40. Alan Carter, Tel. 01483 208535 (W. Surrey).

FOR SALE: Bush TU612A 12" TV (1949, same chassis as TV12), console model, good runner, good cabinet, can demo. by appointment, £100. Utility set U21 (Philco) complete, original, works well £75. Philips 787AX Monoknob deluxe (2x Pen A4 o/p stage) fully working, cabinet fair £40. DAC90A brown, metal grille, no cracks, complete and working £50. All sets ready to use. Tim Jarman, 7 Cadet Way, Church Crookham, Fleet, Hants GU13 0UG. Tel. 01252 616 938 (evenings).

WANTED: Still researching the Eagle Engineering Co, of Warwick who made "Chakophone" wireless sets between 1923 and 1936. Seek any relevant information on this Company or its product, to help research. **ALSO WANTED** the shorting switch for the Eddystone S689 Bug key, **any information** on the Eddy stone Twin wireless with or without battery case and the Eddystone military wireless type R101, especially photo or drawing. Andrew Humphriss, Tel. 01926 423120 or e-mail andrewhumpriss@tinyworld.co.uk

WANTED: Pin connections for the pin connector on the front of US Navy receiver CW-46048D. Also looking for a plug for this connector. Dennis Goacher, 27 Glevum Road, Swindon SN3 4AA. Tel. 01793 828188.

WANTED: Single Channel TV sets, age or condition unimportant. Any pre-war radio with the capability to receive TV sound. Video copy of Helen McKay singing "Here's looking at you". Pye B16T and B18T TV receivers. Please write to Peter Carlton, 6 Tuckers Park, Buckland Brewer, Bideford, Devon EX39 5LL.

WANTED: To complete restoration I need a dial for a Murphy model A188C radio. Please can you help? T.Rosati, 3 Joydens Wood Road, Bexley, Kent DA5 2HS. Tel. 01322 551127.

WANTED: TELEGRAPHY (esp. land-line) I am looking for somewhat special apparatus: Double and Single-Needle, Wheatstone, Morse etc. Buy or swap. I can swap for (amongst others) early electricity (e.g. tubes from Crookes, Geissler, Röntgen; Ruhmkorff coils, Wimshurst). Who else collects telegraphy? All letters answered. My book Classics of Communication is still available at £20.00 incl. shipping. Fons Vanden Berghen, Lenniksesteenweg 462/22, B-1500 Halle, Belgium. Tel. +32-2-356 05 56 (home, late evening);

[continued on next page]

office: +32-16-38 27 21 or fax +32 16 38 24 38. E-mail fovabe@teindus.be

WANTED: Ferguson 201 RG radiogram c.1947 onward, good, original and working. Also Sound Sales loudspeaker as supplied to schools 1940s/1950s. Varnished case, handle on top, no back. Terry Bennett Tel. 01262 608297 or 9 St. Aidan Road, Bridlington YO16 7SP.

FOR SALE: R1155 W.O. Eddystone 659 W.O. Pye 350. Gecophone Music Magnet 4. Cossor Melody Maker as fig. 328 R! R!. KB Kobra 305. Ultra Tiger. McMichael Duplex 4. Murphy A4. Ekco AC74. GEC Superhet 5. HMV 463. Philips V5A. Philips 830A. Decca Triple 5. Ever Ready 'C'. Ferranti 146. Ultra T401. Cossor 464. Ekco A23. Ekco U29X. Philips 462A. Masteradio D110. GEC BC4750. GEC BC4835R. Plus many more; also a selection of American sets that have been converted from 110v to 240v. Ring George Glendinning 01228 576618 ev'ngs.

WANTED: Wave-change knob, back and circuit details for Pye 350. Ken Lloyd, 10 The Verneys, Cheltenham GL53 7DB. Tel. 01242 230225.

WANTED: For restoration of WW1 CW Mk3 2-valve receiver; ebonite knob engraved on top rim "aerial tuning condenser", with or without 180° dial; £20 offered for good example. 2-pin plugs engraved "6 volt" & "selector". 3-pin plug with two terminals marked "receiver adapter". Ebonite panel with 3 sockets engraved "AE LT+ LT-". Also detector cover for Belling-Lee crystal set, marked "Belling-Lee Crystal Detector Patent No. 5808/24." M. Butt, 3 Harewell Walk, Wells, Somerset BA5 2EZ. Tel. 01749 676635 (evenings).

WANTED: Early (pre 1975) colour television equipment, sets, spare parts, catalogues, etc. Telephone Keith Parker on 02084 225049.

FOR SALE: Several Eddystone and Clarke & Smith, 1155 etc. receivers. Please phone Peter for list! 01372 454381 or 07774 128170 any time (Surrey).

WANTED: Chassis for Philco Peoples Set Model 444 or Model V537. Peter Wilson, Tel. 0208 577 7938 (Middlesex).

WANTED: 'Spearettie' B8D valve pin alignment tool as provided with the Mk 123 set, but presumably not unique to that equipment. Antony Wedgwood, Tel. 020 7607 2954, e-mail antony@wedgwood.fsbusiness.co.uk

WANTED: Circuit diagram and manual for Mullard High Speed valve tester; photocopies acceptable. Martin Scobie, Tel. 01803 293157 (Devon).

WANTED: Early 405 sets to increase my collection, good prices paid, will collect. Also a rubber mask for the screen of a 6" tube VCR97 type. Contact Geoff Holden on 013398 81202 or e-mail gholden804@aol.com

WANTED: Cabinet for KB BM20 Beehive; any colour considered but good condition is essential. Gary Tempest, 127 Burlescoombe Road, Thorpe Bay, Essex SS1 3PT. Tel. 01702 586016. E-mail gary@gtempest.freemove.co.uk

WANTED: Mains transformer or scrap Mullard High Speed Valve Tester, cash paid. Martin Scobie, Tel. 01803 293157 (Devon).

For Sale. 1923 (BBC stamp) Brown Microphone amplifier (mint), £250.

1924 Burndept 2-valve short wave receiver (30-100 metres) Mark II (with two original Burndept valves type H.310 & HL310 with good filaments) in VG original condition, offers. 1923 (BBC stamp) Ediswan crystal set type No. 1924 (mint), £150. 1924 Fuller's 'Sparta' crystal set (VGC), £150. 1924 Lampitt & Elliott crystal set in imitation crocodile-skin covered case, £175. 1924 Marconi-Reisz microphone in octagonal marble base (GC), £225. 1923 (BBC stamp) Revo horn loudspeaker on sculptured cast base with 14" flare (VGC), £150. 1924 Amplion horn loudspeaker type Swan-neck junior with 10" metal flare (GC), £75. 1924 Bullphone 'Nightingale' horn loudspeaker with wood effect 14" flare (VGC), £150. 1929 Philips cabinet loudspeaker type 4512 with lamp shape fretwork (mint), £50. 1929 KB Pup receiver (mint and working), £100. 1930 Philips newsagent poster and two Philips publicity posters (mint) £75 the three. 1950 KB mains radio type FB10 (bakelite toaster shaped cabinet) in cream (mint), £100. 1957 Ekco battery portable radio type EK257 (new because of being unsold by Ekco dealer), £50. Gordon Bussey. Tel. 0208 660 2240

WANTED: Set of clips that hold the spare Range Block in the Marconiphone V2 receiver. Two-volt glass accumulator for display only. Gordon Williams, Tel. 01202 555939 (leave a message) or e-mail williams1@aol.com

WANTED: Marconi 296 or HMV 442. **FOR SALE OR SWAP:** most radio and TV valves available, all tested before despatch. Dave Thompson, 83 School Lane, Hartford, Cheshire CW8 1PW. Tel. 01606 871082.

WANTED: To complete long-standing project: W.B. baseboard nine and seven pin valveholders, must be complete. Eddystone four-pin plug-in coils; pink, green, brown and grey ranges. Also needed, a wax covered Bulgin R.F.C. and a brown bakelite moulded condenser .02 mF or larger. These should have useful length wire leads. Bernard Litherland, The Old School House, North Wraxall, Wiltshire SN14 7AB. Tel. 01225 891254 any time.

FREE TO A GOOD HOME: Leevers Rich E200 series studio console tape recorder $\frac{1}{2}$ track 2 channel stereo, high speed ($7\frac{1}{2}$ and 15 IPS) ex BBC, recently saved from the skip. The equipment appears complete and running; unfortunately there is no documentation. The recorder is currently in store in the Old Street area of London, so you will have to arrange collection. It should fit into a medium-sized hatchback such as a VW Golf. Please contact Terry Martini on 07947 460161 or by e-mail: audiovisual@bmbthonline.net to arrange collection.

WANTED: Philco Model 269 radio (Fig. 523 R!R!) in reasonable condition, required urgently. Please call Ted Carter on 0208 698 9994.

FOR SALE: Following Bush bakelite radios in good condition: DAC90A brown £50. DAC90A off-white £100. DAC10 brown £50. VHF 71 in original Bush transit box with British Rail freight label and guarantee card £75. **WANTED:** Sony Betamax VCRs post-1982. Grundig V2000 2x8 stereo type 2280 and U.K. manual. Please phone Alan Stubbings 01522 702601 evenings (Lincoln).

WANTED: Following radio receivers: Murphy A8 (1932), Ekco PB179/PBU179 (1938), Ferranti 139 (1939), John Sully 01707 659883, e-mail john.sully@bt.com.

WANTED: Coil unit for Philco 333 (L7, 8, 9, 10, 11 & C18, C19) with or without shield; either type of coil or scrap/good chassis with 3 coil cans (battery TRF 1936). Chris Price, The Cottage, Wood End Lane, Fillongley, Warwickshire CV7 8DF. Tel/Fax 01676 540438.

THANK YOU to whoever recovered my wallet, inadvertently left on a stall at Harpenden on 2 September, and returned it to the organisers. Ian Higginbottom.

For sale. Two 1923 Sterling anode reaction units (VGC), £50 the pair. 1920s plug-in coils. AJS (bakelite): 150 X 2. Igranice: 750, 250 x 3 (1 boxed), 200 x 2, 150 x 3 (1 boxed), 100, 75 x 2, 40, 35, 25 x 2. Curry: 5XX, 200, 35. Clarke: 'Atlas' 5XX (boxed). Hawk: 150 (boxed), 75 (boxed). Faradex: 200. Airmax: 35 X 2. Polar: 4-pin twin circular coil 850/300. All in VG condition, £135 for the twenty eight. Two 1923 BTH transformers (GC), £20 the pair. Gordon Bussey. Tel. 0208 660 2240

FOR SALE: Condition ranges from very good to excellent: **Radiograms:** Rogers Majestic, fabulous mock Tudor sideboard-type cabinet, mono, 2SW. RGD 1046m, Beethoven 404, supplied by Harrods! **Table Radios:** Pye P45 L,M, 3 SW. Standard Norwegian 40s set. Invicta A46/PB600, LMS, trawlers, 12 presets. Ferguson 356, LMS. Cossor battery set. NRK Prior 3. Norwegian 1949, M, 2SW. Standard Pan48, Norway, MW/SW, 1947. Hacker Mayflower FM only. Pye P53 LM, 5xSW,T. Richard Allen Baffleette TV Sound Receiver. Pye P75A, LMS, 1953. Philips 1510, LM. **Vintage audio:** Pair stacked Quad Electrostatics. Classic Empire belt drive turntable in plinth with Empire arm. Radford Pre/Power. Radford test eqpt. All in store nut must now sell, Located in Aldershot, Surrey. **WANTED:** Eddystone equipment or ephemera. Marconi, Tektronix, R&S, B&K catalogues. Bound Wireless Worlds, IEE, Inst Phys etc. Alan Ainslie, Tel. 01252 782932. E-mail alan.ainslie@lineone.net Mobile 07989 401489.

WANTED: Vintage 47-gauge enamelled wire, preferably brown. Igranite type J 3:1 bakelite-cased transformer. Cosmos (i.e. not Mazda) ACP1; these have large bulbous envelopes and early examples have top pins and may be nickel based. Guy Peskett, 13 Warneford Road, Oxford OX4 1LT. Tel. 01865 247971. E-mail g.peskett@physics.ox.ac.uk

FOR SALE: Marconi V2A. Lee Deforest D10. Red Star. Philips 830a, 834a.
WANTED: The battery sets Philips 830B, 832B, 2540, 2522, 2802. Ivo Lemmens, Tel/Fax +31 302 712378. E-mail i.p.i.f.lemmens@imroweb.nl

WANTED: Manual/operating instructions for Marconi TF1064 VHF signal generator. Also dials for Marconi T11DA and T18DA. Contact Dave Saxton on 01992 575248 (Essex).

RADIO LISTENER'S GUIDE: The 2002 edition is now available. This contains 152 pages of data, including a complete listing of national and commercial broadcast stations in the UK and Irish Republic, with tables and maps giving their frequencies, locations and service areas. It contains advice on choosing radios and aerials, plus an illustrated critical review of the available models. It may be obtained from Radio Listeners Guide, FREEPOST (SWB40688), Plymouth PL8 1DX. Tel. 01752 872888, e-mail clive@radiolistenersguide.co.uk - web site www.radiolistenersguide.co.uk - Price £5.75 (including p+p).

